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ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 115

DATE: Thursday, February 27, 1992

BEFORE:

| | |
|------------------------------|----------|
| HON. MR. JUSTICE E. SAUNDERS | Chairman |
| DR. G. CONNELL | Member |
| MS. G. PATTERSON | Member |

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,
R.S.O. 1980, c. 140, as amended, and Regulations
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro
consisting of a program in respect of activities
associated with meeting future electricity
requirements in Ontario.

Held on the 5th Floor, 2200
Yonge Street, Toronto, Ontario,
on Thursday, the 27th day of February,
1992, commencing at 10:00 a.m.


VOLUME 115

B E F O R E :

| | |
|----------------------------------|----------|
| THE HON. MR. JUSTICE E. SAUNDERS | Chairman |
| DR. G. CONNELL | Member |
| MS. G. PATTERSON | Member |

S T A F F :

| | |
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| 452B | Updated Figures From Chapters 3 to 12 of the Demand/Supply Plan Report (Exhibit 3). | 19962 |
| 493 | Reserved. | 19962 |
| 475.28 | Interrogatory No. 8.9.83. | 19963 |
| 494 | Materials including Interrogatory 8.9.83 (475.28). | 19998 |
| 495 | Document entitled: The Changing Atmosphere: Implications for Global Security, Conference Statement, Toronto, Ontario, Canada, June 27-30, 1988. | 20006 |
| 496 | Document entitled: Stopping Air Pollution At Its Source. | 20050 |
| 497 | Calculation by Mr. Heintzman of the CO(2) emission avoided if Hydro forgoes the life extension of Lambton and Nanticoke. | 20071 |
| 475.29 | Interrogatory No. 8.42.15. | 20076 |
| 475.30 | Interrogatory No. 8.14.5. | 20097 |
| 475.31 | Interrogatory No. 8.42.13. | 20106 |
| 493 | California Energy Commission's Technology Report, dated November, 1991. | 20114 |
| 498 | Video shown during Panel 2. | 20116 |
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| <u>No.</u> | <u>Description</u> | <u>Page No.</u> |
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| 478.22 | Ontario Hydro undertakes to provide a critique of Exhibit 497. | 20076 |
| 478.23 | Ontario Hydro undertakes to produce its issue paper on the issue of ash management, intended for the Ministry of the Environment. | 20101 |
| 478.24 | Ontario Hydro undertakes to clarify table 1 on page 42 of Exhibit 494, concerning whether air and water emissions are included and to add solid waste. | 20112 |

TIME NOTATIONSPage No.

| | | | |
|-----------------|------------|-------|-------|
| | 10:03 a.m. | ----- | 19962 |
| | 10:12 a.m. | ----- | 19970 |
| | 10:25 a.m. | ----- | 19977 |
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| | 4:05 p.m. | ----- | 20125 |
| | 4:25 p.m. | ----- | 20141 |
| | 4:53 p.m. | ----- | 20155 |
| Adjourned | 5:00 p.m. | ----- | 20168 |

1 ---Upon commencing at 10:03 a.m.

2 THE REGISTRAR: Please come to order.

3 This hearing is now in session. Be seated, please.

4 THE CHAIRMAN: I want to put on to the
5 record Exhibit No. 452B, as in Baker, it is filed by
6 Ontario Hydro and is entitled, Updated Figures From
7 Chapters 3 to 12 of the Demand/Supply Plan Report
8 (Exhibit 3).

9 Also to note that Exhibit No. 493, which
10 is the next exhibit, has been asked to be reserved by
11 IPPSO for their filing for the cross-examination of
12 this panel.

13 ---EXHIBIT NO. 452B: Updated Figures From Chapters 3
14 to 12 of the Demand/Supply Plan Report
(Exhibit 3).

15 ---EXHIBIT NO. 493: Reserved.

16 THE CHAIRMAN: Mr. Heintzman?

17 MR. HEINTZMAN: Thank you, Mr. Chairman.

18 I think most of my questions will be
19 directed to Dr. Effer and Mr. Shalaby and Mr. Meehan.

20 Perhaps I can advise the panel which
21 exhibits I think I will be referring to so you have a
22 report. I believe I will be referring to the DSP
23 Exhibit 3; to the environmental statement, Exhibit 4,
24 Exhibit 40; Exhibit 452; Exhibit 479; Exhibit 470 --

25 THE CHAIRMAN: Did you say 479?

1 MR. HEINTZMAN: 40; 479; 470; 452. I
2 didn't give you those in numerical order but I think
3 those are the ones that I will be referring to.

4 I will be referring to a small package of
5 documents which have been, I hope, delivered to the
6 Board.

7 With the Board's permission I will
8 examine and then Cindy Findlay will complete the
9 examination after the subjects that we have divided up
10 between the two of us, if that's satisfactory.

11 THE CHAIRMAN: That is fine.

12 Do you have a page of documents you want
13 marked as an exhibit?

14 MR. HEINTZMAN: If they could be, yes.

15 THE REGISTRAR: Which package do you want
16 first, Mr. Heintzman?

17 MR. HEINTZMAN: The package starting off
18 with Interrogatory 8.9.83.

19 THE REGISTRAR: 8.9.83 is given 475.28.

20 THE CHAIRMAN: There is a package, could
21 we have the package now?

22 MR. HEINTZMAN: The package contains that
23 interrogatory and some other documents, and another
24 interrogatory.

25 ---EXHIBIT NO. 475.28: Interrogatory No. 8.9.83.

1 THE CHAIRMAN: Now, I don't immediately
2 recognize -- I have lost my power.

3 ---Off the record.

4 THE CHAIRMAN: I don't immediately
5 recognize 479. What is 479?

6 MR. SHALABY: It's the MEA excerpts from
7 various Hydro documents, interrogatories and other
8 reports.

9 THE CHAIRMAN: It's the MEA package.

10 MR. HEINTZMAN: Yes.

11 THE CHAIRMAN: And 470, I don't recognize
12 it either path.

13 MS. PATTERSON: Dr. Effer's overheads.

14 MR. HEINTZMAN: Dr. Effer's overheads.

15 THE CHAIRMAN: Thank you.

16 ARTHUR RAYMOND EFFER,
17 CHARLES WILLIAM DAWSON,
18 JAMES RICHARD BURPEE,
19 GARY NEIL MEEHAN,
JOHN DOUGLAS SMITH,
AMIR SHALABY; Resumed.

20 CROSS-EXAMINATION BY MR. HEINTZMAN:

21 Q. Just by way of introduction, Dr.
22 Effer, if I can just understand your participation and
23 the participation of your department in the preparation
24 of the DSP. As I understand it from the evidence that
25 you have given, you were the chairman of the department

1 responsible for scrutinizing environmental issues with
2 respect to generation.

3 DR. EFFER: A. I was the manager of that
4 department, yes. Thank you for that promotion.

5 Q. Members of your department
6 participated in the preparation of the DSP?

7 A. That is correct.

8 Q. I take it therefore that as the
9 manager of the department you were involved in
10 scrutinizing and approving the environmental issues
11 relating generation in the DSP?

12 A. I reviewed those environmental
13 issues, yes.

14 Q. Yes.

15 Mr. Shalaby, you, as I understand it,
16 were involved also in the DSP as the coordinator of the
17 DSP.

18 MR. SHALABY: A. That is correct.

19 Q. And, Mr. Meehan, were you involved in
20 the preparation of the DSP to the extent that it
21 related to power systems planning?

22 MR. MEEHAN: A. My involvement was more
23 with the thermal cost review. I was indirectly
24 involved with the Demand/Supply Plan.

25 Q. Were members of your department

1 involved so far as power systems planning issues were
2 concerned in the DSP?

3 A. Not directly.

4 Q. I don't know if either of the other
5 gentlemen were involved in the DSP, if you were I would
6 like to know the involvement that each of you had in
7 the preparation of the Plan.

8 Do I take it from silence that the other
9 three gentlemen were not directly involved in the
10 preparation of the DSP?

11 MR. SMITH: A. I would have to say I was
12 involved, yes.

13 Q. You were involved?

14 A. Yes. My staff were heavily involved
15 in terms of putting in information on fuel availability
16 and prices and I served on an advisory committee during
17 the preparation of the DSP and am directly involved in
18 the thermal cost review.

19 MR. BURPEE: A. My involvement has only
20 been the thermal cost update.

21 MR. DAWSON: A. I was involved in the
22 preparation of the thermal cost review but not directly
23 in the Demand/Supply Plan that followed from that.

24 Q. Fine.

25 So, Dr. Effer, what I will do is I am

1 going to ask some questions about the DSP and what I
2 will do is I will pose them to you because they are
3 largely environmental, and if they have to be handed
4 off to someone else, then I will assume that that will
5 occur in due course.

6 In the DSP, as we see, fossil generation
7 is one of the alternatives suggested for base load.

8 DR. EFFER: A. That's correct.

9 Q. I am primarily directing my attention
10 to the question of base load power energy in my
11 examination.

12 In giving consideration to the
13 appropriate base load for the future of Ontario Hydro's
14 needs, nuclear generation was one of the alternatives
15 to fossil generation?

16 A. That's correct.

17 Q. One of the functions, in fact the
18 basic function of the DSP was to review the
19 environmental pros and cons of fossil generation as
20 opposed to nuclear generation.

21 A. That comparison came out amongst
22 other comparisons, yes.

23 Q. Giving consideration to that, I am
24 going to take you through the document.

25 Ontario Hydro gave very specific

1 consideration to the emission of gases that have been
2 discussed during this panel, including greenhouse
3 gases, SO(2), NOx's and other emissions?

4 A. Yes, we did cover those emissions.

5 Q. Yes. And would I be fair to say from
6 a review of the DSP that Ontario Hydro considered the
7 emissions of those gases, and particularly greenhouse
8 gases, as probably the most severe or serious
9 environmental issue facing Ontario Hydro?

10 A. I don't think that particular
11 conclusion was reached in the DSP, and I think it's a
12 matter of opinion as to whether that is the severest
13 environmental issue.

14 Q. Well, let's start with one point.

15 It is, Ontario Hydro has said in some of
16 the documents we will go through, a serious issue for
17 Ontario Hydro; namely, the production of these gases.

18 A. It is a major issue within the
19 corporation, yes.

20 Q. In terms of your opinion, would you
21 say it is the most serious issue that Ontario Hydro has
22 to face in at the present time, production of
23 greenhouse gases in particular?

24 A. No.

25 Q. You would not say it's the most

1 important?

2 A. No, I wouldn't.

3 Q. But it ranks up among the important
4 issues?

5 A. Yes.

6 Q. When we are talking about those sorts
7 of emissions, would you agree with me that they are
8 particularly serious with respect to carbon dioxide by
9 virtue of the fact that there is at present no known
10 technology to remove carbon dioxide from those
11 emissions?

12 A. No. I don't think there is a
13 conclusion there. The difficulty of removal doesn't
14 mean that it is a serious matter from an environmental
15 point of view. The connection I think is not
16 necessarily correct.

17 Q. Let's divide that down. There is, as
18 I understand the documents we have before the Board, no
19 present technology to remove carbon dioxide from
20 emissions being emitted by Ontario Hydro.

21 A. There is no commercially available
22 and economic technology available.

23 Q. Yes. The production of carbon
24 dioxide and other greenhouse gases is, you have told
25 us, of considerable importance to Ontario Hydro and to

1 the Ontario government.

2 [10:12 a.m.]

3 A. It is a major issue which is
4 occupying the government's attention, and it is
5 reflected in some attention being paid by Ontario
6 Hydro.

7 Q. Yes. And apart from absorption by
8 the earth and whatnot, carbon dioxide, once produced,
9 does remain in the ecosystem?

10 A. Yes.

11 Q. Yes. So that to the extent that
12 there is production of carbon dioxide, and the other
13 things we will discuss, they are being generated into
14 the ecosystem and are remaining there, subject to
15 absorption?

16 A. Yes, there may be some small amount
17 of carbon dioxide depleted through other atmospheric
18 processes, but it is probably minor.

19 Q. Now, do you have the DSP in front of
20 you, sir?

21 A. Yes, I do.

22 Q. What I would like to do is just
23 review with you the DSP in relation to this issue, and
24 maybe I can shorten it by putting this proposition to
25 you, that what we see in the DSP is, so far as

1 environmental issues are concerned, a decision or
2 opinion of Ontario Hydro to prefer nuclear generation
3 over fossil generation because of this environmental
4 issue. Is that not a fair statement?

5 A. I don't think that statement was
6 clearly set out in the DSP. It is one opinion of some
7 of the contributing authors that that is the case, yes.

8 Q. Yes. Well, I suggest to you that
9 when you read the DSP that the only conclusion that you
10 can arrive at is that for environmental reasons - and I
11 will come to other reasons - nuclear generation should
12 be preferred over fossil generation. Is that a fair
13 statement?

14 MR. SHALABY: A. Can I interject for a
15 second?

16 Q. Certainly.

17 A. I think we preferred and clearly
18 indicated that Panel 8 would describe fossil options.
19 Comparison between options we will deal with in Panel
20 10. The tradeoffs between options and how different
21 options fit together in an integrated plan is more
22 appropriately addressed, in my view, in Panel 10.

23 THE CHAIRMAN: We would expect, then,
24 that there will be some technical evidence on Panel 10
25 to deal with the kind of concerns that Mr. Heintzman is

1 talking about.

2 I mean, I think the comparison between
3 the two options is certainly extremely relevant to this
4 hearing, and so one way or the other we have got to get
5 the technical evidence that Hydro wants to put forward,
6 one place or the other.

7 MR. HEINTZMAN: As I understand Panel 10,
8 we will be comparing options in the sense that we will
9 be analyzing Plan 15 as against Plan 22 or against the
10 Update, but if I am going to get on the record the
11 building blocks for a discussion it seems to me that I
12 have to examine those people who are knowledgeable
13 about fossil generation and who can tell us in respect
14 of that technology the pros and cons vis-a-vis another
15 one so that we can then have an intelligent discussion
16 on Panel 10.

17 These gentlemen are the knowledgeable
18 ones with respect to fossil and I can only discuss
19 fossil as it relates to other alternatives, and I
20 submit that those are proper questions at this time.

21 MS. KARISH: I would only add that I
22 think that the plan was that, as Mr. Shalaby has said,
23 that Panel 8 would discuss the characteristics of
24 fossil and then Panel 9 would discuss the
25 characteristics of nuclear, and then Panel 10 could do

1 the comparisons once the characteristics have been
2 fully described.

3 THE CHAIRMAN: From a technical point of
4 view? Because I think that --

5 MS. KARISH: I think that should be
6 contemplated as well, yes.

7 THE CHAIRMAN: I don't think there should
8 be any misunderstanding about this because it is an
9 extremely relevant issue.

10 MR. SHALABY: Maybe we can ask the
11 question of what is meant by "from a technical point of
12 view" - the tradeoffs between characteristics of
13 options?

14 THE CHAIRMAN: Well, at some point we are
15 going to have to have some evidence of what Hydro's
16 position is with respect to the comparison of various
17 options, hydraulic, fossil, nuclear, particularly
18 fossil and nuclear, I would think.

19 MR. SHALABY: I would expect that to be
20 more a Panel 10 issue than it is a Panel 8 or Panel 9.

21 THE CHAIRMAN: We don't want to be
22 confronted with Panel 10 telling us that they don't
23 have the technical expertise to answer those questions.

24 MR. HEINTZMAN: Well, Mr. Chairman, Dr.
25 Effer is the chairman of the department or was the

1 manager of the department that is responsible for
2 scrutinizing the environmental issues with respect to
3 generation.

4 Now, I would have thought that when I am
5 talking about nuclear generation or fossil generation
6 as this Panel is concerned with, he is the ideal person
7 to tell us the information and to help us understand
8 the DSP in that regard, and I would suggest that we
9 can't intelligently discuss fossil generation without
10 putting it in context.

11 THE CHAIRMAN: Well, this is
12 cross-examination, and you are free to ask Dr. Effer
13 any question that is relevant to this hearing that he
14 is able to answer. If he is not able to answer it,
15 then that is fine, but you can ask these questions as
16 broadly as you would care to.

17 MR. HEINTZMAN: Q. So if we could turn
18 to the DSP at page 15-6 - and this portion of the
19 document is Exhibit 3 - the report is telling us under
20 the heading "Greenhouse Gas Emissions" that there are
21 emerging concerns about the emission of greenhouse
22 gases, particularly CO(2):

23 Carbon dioxide is the principal gas
24 produced by fossil combustion in
25 producing electricity. There are no

1 regulations governing these emissions,
2 but an illustrative target cutting CO(2)
3 by 20 per cent of 1988 levels by 2005 has
4 been put forward by federal and
5 provincial ministries, et cetera.

6 So we see a discussion there about CO(2)
7 and greenhouse gas emissions; correct?

8 DR. EFFER: A. That is correct, yes.

9 Q. Right. If you turn then over to the
10 next page, page 15-8, we see the discussion of Case 15,
11 and Case 15, it says:

12 ...is designed to achieve both low
13 air emissions and low cost. A mix of
14 base load nuclear and peaking fossil
15 options is used to achieve low acid gas
16 and greenhouse emissions, low cost,
17 flexibility and capacity diversion.

18 Do you see that?

19 A. Yes, I do.

20 Q. Right. And we know that Ontario
21 Hydro preferred and put forward Case 15?

22 A. That is correct, yes.

23 Q. In terms of environmental issues, the
24 only or the primary issue that this paragraph is
25 directing us to in making that choice for a

1 predominantly nuclear option is the question of low
2 acid gas and greenhouse emissions?

3 A. Yes, correct.

4 Q. So that the rationale on an
5 environmental basis for this choice is that nuclear or
6 a predominantly nuclear option will give us that
7 result?

8 A. Correct.

9 Q. Right. So that my question to you
10 when I started this discussion was in making the choice
11 between a nuclear and a fossil option this report tells
12 us that the DSP and Ontario Hydro was preferring a
13 nuclear option because of the concerns about acid gas
14 and greenhouse emissions. That is a correct statement,
15 isn't it?

16 A. Not entirely. It includes
17 environmental issues and the other items in that
18 paragraph as arriving at the preferred option.

19 Q. Yes. I will come to the other
20 issues, but on environmental issues --

21 A. Environmental issues were mentioned
22 there for preferring option 15, yes.

23 Q. Yes. So that from an environmental
24 standpoint Ontario Hydro in the DSP was preferring
25 nuclear over fossil, and it was doing so because of its

1 concerns about acid gas and greenhouse emissions?

2 A. Correct.

3 MR. SHALABY: A. You are still
4 qualifying all of that "for base load use"; is that
5 correct?

6 Q. Base load use, yes.

7 A. So those answers apply to base load
8 use?

9 Q. Yes, exactly. Then, if we go to page
10 17-15 we have the comparison in the bottom right-hand
11 corner and going on to page 17-17 of the various
12 criteria that Ontario Hydro applied in arriving at its
13 conclusion that Plan 15 was the preferred alternative;
14 right?

15 [10:25 a.m.]

16 DR. EFFER: A. Yes, I see that.

17 Q. Yes. Insofar as environmental issues
18 are concerned, the three issues discussed under this
19 analysis are on page 17-17 under the headings Acid Gas
20 Emissions, CO(2) Emissions, and the bottom of the page,
21 Radioactivity Concerns.

22 Do you see those headings?

23 A. Yes, I do.

24 Q. And again, in terms of environmental
25 issues, considering these two alternatives, that is

1 nuclear and fossil, it was Ontario Hydro's position
2 that the concern about acid gas emissions and CO(2)
3 emissions lead to a preference for nuclear and lead to
4 a preference therefore for Plan 15; is that a fair
5 statement?

6 A. Acid gas emissions were given a high
7 profile in that decision-making, yes.

8 Q. Yes. And the acid gas emissions and
9 CO(2) emissions lead Ontario Hydro to the conclusion
10 that a nuclear based alternative was preferable for a
11 base load power, to one where fossil generation was the
12 predominant source of generation?

13 A. That's correct.

14 Q. So, in Plan 15, as I understand the
15 document, about two-thirds of the capacity, about 90
16 per cent of the energy produced from major new supply
17 that was discussed in this report is coming from
18 nuclear; would that be a fair statement?

19 MR. SHALABY: A. Under median forecasts,
20 I remember that to be about right, yes.

21 Q. Yes. If we could look at Exhibit 4
22 which is the environmental analysis, do you have that,
23 sir?

24 DR. EFFER: A. Yes, I do.

25 Q. If you would turn with me to page

1 6-15. That page gives sort of a summary of the issues
2 and we can see at the top of the page in the middle the
3 words Natural Environment and six levels of boxes, and
4 then about the middle of the page, the words Social
5 Environment and another seven boxes or groups of boxes
6 running down from that.

7 Do you see that?

8 A. Yes, I do.

9 Q. In terms of the natural environment
10 and the six boxes and the arrows going to the left or
11 right, to the left being to Cases 23 and 22 being the
12 high nuclear alternatives, and to the right being to
13 Cases 24 and 26 being the high fossil alternatives?

14 A. Yes, I see it.

15 Q. In four of the six criteria the
16 preference is given to the nuclear alternative over the
17 fossil alternative by the arrows we can see leading
18 towards fuel, land use, air, and wastes. Do you see
19 those?

20 A. Yes, I do.

21 Q. And it's only in respect of the water
22 use, two water uses, that the arrow goes to the fossil
23 or right-hand side of the diagram; am I correct?

24 A. Yes. I think two of those six issues
25 are rather neutral, would you not say?

1 Q. The two water uses?

2 A. No, the fuel and the land use would
3 there -- I don't know how you draw a preference out of
4 saying the lowest of fossil fuel and the highest
5 uranium use. That is a neutral observation; is it not?

6 Q. I am just looking at the diagram and
7 I have read the text that to tries to analyze each of
8 these issues and for whatever reasons the authors have
9 said that the nuclear option is preferable on those
10 various grounds and so indicated by arrows; correct?

11 A. Within the block there are statements
12 there which I consider to be neutral.

13 Q. Perhaps. But the authors of this
14 report have indicated that on these four criteria fuel,
15 land use, air, and wastes, the nuclear alternative is
16 preferable to the fossil; correct?

17 A. I would go down each one in turn and
18 say, as far as fuel it's neutral, as far as land use
19 it's neutral, as far as water use, the preference is to
20 fossil, to air the preference is to nuclear, as far as
21 water is concerned the preference is to fossil, and in
22 the waste areas the preference is possibly neutral,
23 possibly in favour of nuclear. But I couldn't conclude
24 that four out of the six are definitely leaning towards
25 preference to nuclear in the environmental area.

1 Q. Well, are you expressing a personal
2 view or are you helping us understand what the authors
3 of this document were saying?

4 A. I am trying to draw your attention
5 that looking at the two extremes between Case 23 and 26
6 for example, as fuel, there is a statement there saying
7 lowest, in the case of Case 23, we are saying the
8 lowest of fossil fuel, the highest of uranium use, and
9 in Case 26 we are saying highest use of fossil fuel,
10 lowest uranium use. Those are observations and no
11 conclusion is being drawn there that one extreme to the
12 other is preferring one generation over the other.

13 Q. No, but as I understood what the
14 authors were saying is that there are environmental
15 impacts that go along with using one fuel in terms of
16 mining, in terms of all sorts of aspects of that fuel,
17 and in totality, the preference is to nuclear over
18 fossil. That's what I understand this document and
19 this chart was telling us.

20 A. Yes, in the sense that the arrows are
21 showing preference that is a conclusion that can be
22 reasonably drawn.

23 Q. Thank you. So, leaving the
24 environmental issue before we go to the next, it was
25 Ontario Hydro's judgment at the time the DSP was

1 prepared that for environmental reasons the nuclear
2 option was preferable to the fossil option; that's
3 correct, is it not?

4 A. On balance, yes.

5 Q. Yes. And you have, would I be
6 correct, no different information today? In fact, the
7 environmental concerns with respect to fossil
8 generation are at least as great if not greater?

9 A. I would say that with the
10 demand/supply update, with our commitment for much
11 increased scrubbers and other back-end fixtures, within
12 the corporation the concern over fossil emissions is
13 much reduced.

14 Q. Has Ontario Hydro done the kind of
15 analysis that is in the DSP and in the backup to the
16 DSP on this comparison between fossil and nuclear for
17 the Update? Because if it has, I haven't seen it.

18 A. No, that hasn't been done.

19 Q. So all you can say is that from
20 reading the Update, we can see that you are intending
21 to install some scrubbers and other devices, but no
22 definitive or other study has been done to go through
23 this analysis again?

24 A. No comparison has been made, no.

25 Q. The question of installing scrubbers

1 and whatnot, all of those kind of devices applicable to
2 fossil generation are discussed in the DSP; were they
3 not?

4 A. Yes, they were.

5 Q. So that they were known at the time
6 the DSP was prepared?

7 A. That is correct.

8 Q. And the knowledge about them is not
9 materially different as disclosed in the DSP, than
10 disclosed in the Update?

11 A. The knowledge of them isn't changed.
12 A commitment to a planned installation of these has
13 changed.

14 Q. How do you say the commitment? Has
15 the commitment to install them in Lambton changed?

16 A. The demand/supply update describes
17 the increased commitment to the putting scrubbers and
18 other cleanup devices on fossil stations.

19 Q. But the update is a planning
20 document. There is no actual commitment in terms of
21 any moneys being spent or anything being done other
22 than the statements being contained in the Update.

23 A. We can say that those installations
24 to reduce fossil plant emissions are planned for the
25 future.

1 Q. They are planned in the sense that
2 they are stated the Update?

3 A. That's correct, yes.

4 Q. But it hasn't gone any further than
5 that?

6 A. Not to my knowledge.

7 Q. Now, let me then examine a second
8 aspect of fossil generation that was addressed in the
9 DSP - and again, compare it to nuclear generation - and
10 that is the present availability of technology. Is it
11 fair to say that in the DSP much of the technology to
12 abate acid gases or greenhouse gases was stated as
13 being imperfect, as yet unknown, and as yet untried by
14 Ontario Hydro?

15 A. I wouldn't classify all of those
16 abatement technologies with the adjectives you used.
17 Untried is not an appropriate one for scrubbers, for
18 example. I think we drew attention to the fact that
19 other abatement technologies do require more
20 development and more research.

21 Q. Yes. And some of those adjectives or
22 descriptions I said apply to some of the technologies.
23 Some of them have been untried, et cetera. And the DSP
24 refer to that as being a concern with respect to the
25 application of fossil generation.

1 A. Yes, we did talk about the relative
2 states of development of each technology.

3 Q. Whereas, in the case of nuclear
4 generation, the technology is tried and true and
5 home-grown and available; is that not fair?

6 A. I can't comment on that.

7 MR. DAWSON: A. I am not so sure that I
8 would say that any of the environmental control
9 technology that we are planning to install is untried.
10 It may not have been applied by Ontario Hydro, but I
11 would certainly not describe it as untried.

12 SCR, for instance, there is considerable
13 capacity in both Germany and Japan. Flue gas
14 desulphurization, there is many thousands of megawatts
15 installed in Germany and Japan and the United States.
16 And particulate removal is something that is used both
17 here in Ontario and world-wide.

18 Q. No. But let's look, if we could, at
19 the DSP at 14-24. Maybe we should start at 14-20.
20 Each of the various alternatives are set forth and at
21 the bottom of each page there is a description of
22 technical soundness. Do you see that?

23 A. Right.

24 Q. And, for instance, on the four times
25 800 megawatt U.S. coal alternative option 1, the DSP

1 states, it's the last statement:

2 No Hydro experience with FGD, but
3 there is extensive experience world-wide
4 and good performance demonstrated in the
5 U.S. Experience with SCR is limited to
6 Germany and Japan.

7 [10:40 a.m.]

8 A. Right. That is what I just said, but
9 I am saying it is not untried technology.

10 Q. But the authors --

11 A. Ontario Hydro's experience is limited
12 with that technology, but it is not untried on a
13 worldwide basis.

14 Q. Yes, but the authors felt this to be
15 of sufficient importance that they are telling us that
16 the technical soundness is not yet proven within Hydro;
17 isn't that fair? That is why we are being told this?

18 A. Yes.

19 Q. Yes?

20 A. Yes. For whatever weight that is
21 worth, that is the statement that is being made, yes.

22 Q. Right. When we come over to page
23 14-24 dealing with IGCC, option 8, we are being told
24 under Technical Soundness:

25 Ontario Hydro has no direct

1 experience with this technology, et
2 cetera.

3 A. Yes, that is correct. I don't have a
4 quarrel with that at all.

5 Q. When we get over to page 14-26 under
6 Technical Soundness the authors tell us:

7 Well-established and proven
8 technology with many years of Ontario
9 Hydro experience...

10 A. Correct. Yes.

11 Q. Right. So that what we are being
12 told under Technical Soundness is in terms of
13 preference, one to the other, nuclear generation is
14 technically proven and established, whereas the
15 technologies for application to the fossil generation
16 are not; isn't that fair?

17 A. That is what the document says, yes.
18 My only quarrel was with the word "untried", and I
19 don't think that is a fair description.

20 Q. Is it not fair to say that again that
21 is one of the bases upon which the DSP preferred a
22 nuclear-based option over one involving fossil
23 generation?

24 MR. SHALABY: A. Perhaps I can refer to
25 when we move to chapter 15...

1 Chapter 15, page 15-64, brings together,
2 under one heading called Technical Soundness, areas
3 that Hydro is identifying as -- we are putting some of
4 our thoughts on technical soundness regarding the IGCC
5 option--

6 Q. Yes?

7 A. --regarding the CTU option, the large
8 size that we are putting in our plan is not as commonly
9 used as some of the smaller sizes; about the NOx
10 control; about scrubbers; about large size for coal
11 units; and about disposal of radioactive waste.

12 So we have several areas that we
13 identified technical soundness to be a factor or an
14 issue. Some of them relate to nuclear, some of them
15 relate to fossil.

16 But to say that some components of fossil
17 we have no direct experience with... On the other
18 hand, there are components of fossil we have much
19 longer experience with than nuclear. The balance of
20 the plant, the conversion technology, and the
21 operations and the fuel handling, all of that we have
22 much longer experience and well-established in Ontario
23 and in the world.

24 Q. Well, that may be, but I am just
25 suggesting to you or to Dr. Effer that when one reads

1 figures 14-15 and following it is fair to say that one
2 of the reasons that Ontario Hydro preferred
3 nuclear-based or a predominantly nuclear option over a
4 fossil option was because of the proven technical
5 soundness of the components, including all the
6 components of the systems? Is that not a fair
7 statement?

8 DR. EFFER: A. Yes, with the proviso
9 that, as Mr. Shalaby has drawn your attention to, there
10 are the outstanding issues here on the pages that you
11 referred to which have to be addressed. That is the
12 proviso that I make.

13 Q. Let's then turn to a third criteria
14 of comparison, and that is cost. Again, if we go back
15 to the page where the final analysis was performed,
16 17-15 I believe, is it not fair to say that the cost of
17 nuclear power, the LUEC of nuclear power --

18 MR. SHALABY: A. What page are you on,
19 please?

20 Q. 17-15. And we can go back, if we
21 need to. Perhaps it is best to start off at page 14-29
22 to follow the analysis through.

23 At figure 14-21 on page 14-29 of Exhibit
24 3 the LUEC summaries for the fossil and nuclear options
25 are set forth; correct?

1 A. That is correct.

2 Q. The cost of nuclear generation, for a
3 comparable nuclear generation, to that of coal was
4 less?

5 A. For high base load option operation,
6 yes.

7 Q. Yes. And we could see that as 3.1
8 for a four times 881 megawatt CANDU as opposed to the
9 lowest fossil based option, No. 1, four times 800
10 megawatt U.S. coal at 3.9?

11 A. That is correct.

12 Q. So, when we come forth to the page
13 that I was going to direct your attention to, 17-15,
14 looking at the 25-year plan costs and costs beyond
15 2014, the cost alternatives that were put forward by
16 way of conclusion were driven by the fact that the
17 nuclear generation was the least cost alternative and
18 led to Ontario Hydro's preference on this issue - that
19 is, cost - for a nuclear-based alternative?

20 A. The information on the page indicates
21 that nuclear when used at a high capacity factor is the
22 least cost alternative.

23 Q. Yes.

24 A. You will notice that Plan 22, which
25 has more nuclear, is higher cost than Plan 15. So more

1 nuclear does not necessarily mean lower cost. If you
2 have nuclear that is not being utilized at high
3 capacity factor it contributes to higher costs, not
4 lower cost.

5 Q. If you use nuclear for peaking power
6 you are not going to have the least cost alternative?

7 A. Or even intermediate.

8 Q. Right. So using nuclear as a base
9 power energy alternative was the preferred alternative
10 for Ontario Hydro from a cost standpoint in preparing
11 the DSP over fossil?

12 A. That's correct. That's right.

13 Q. Right. Now, the fourth criteria that
14 I would direct your attention to is the question of the
15 contribution to the Ontario and Canadian economy, and
16 if we look again at page 17-17, we finally get to it
17 under the heading "Balance of Trade", and we see that
18 plan 22, as you have pointed out, Mr. Shalaby, is the
19 high nuclear option, is the most favourable plan from
20 an economics standpoint?

21 A. From a balance of trade standpoint.

22 Q. Yes. And that means the amount of
23 jobs and employment in Canada as opposed to the amount
24 of jobs and employment outside of Canada?

25 A. That is a little -- no, that is a

1 little more limited than that even. This just says the
2 money spent in Canada versus money spent outside of
3 Canada. There is another measure on the employment
4 elsewhere.

5 Q. Let's turn to page 15-8.

6 A. You are at 15-8?

7 Q. Yes, but I am not sure I want to be
8 there.

9 There is a discussion of this issue
10 and -- see if I can find my page. I guess it is 15-53,
11 bottom left-hand corner of the page under the heading
12 Economic Impact-Gross Domestic Product (GDP) and
13 Employment.

14 After the first two sentences it says:

15 Over the lifetime of a CANDU nuclear
16 station typical Canadian and Ontario
17 content is over 90 per cent, about twice
18 that of a conventional steam cycle coal
19 station.

20 Do you see that?

21 A. Yes, I do.

22 Q. So that the installation of a nuclear
23 station results in the content of it being 90 per cent
24 Ontario and Canada whereas a coal station is about 45
25 per cent?

1 A. That is exactly right, yes.

2 Q. So that going back to what we see in
3 the results at the end of the document, the preference
4 here is being given to a nuclear-based option when we
5 get to discuss jobs and the economy because a
6 nuclear-based option will contribute about twice as
7 much to the Ontario and Canadian economy as a fossil
8 generation station?

9 A. Well, the exact contribution to GDP
10 and to employment is in that middle column of that
11 page.

12 Q. Right. I am going to come to that.

13 A. But I am not sure whether it is
14 exactly twice or more or less. They are giving
15 percentages of provincial GDP and employment and so on.

16 Q. But just looking at it on a
17 station-by-station basis what I have just read to you
18 says that on a station-by-station basis a nuclear base
19 load plant will contribute about twice as much in terms
20 of jobs and the employment percentagewise as a coal
21 station.

22 A. It doesn't exactly say "job and
23 employment". It says that it is 90 per cent Canadian
24 and Ontario content. Whether that translates into
25 twice as many jobs, I don't know. We have to read the

1 middle column to know that.

2 Q. Well, let's look at what it says in
3 the middle column.

4 A. Yes.

5 Q. Starting in the third paragraph:

6 Relative to Case 15, Case 22 - which
7 is the higher nuclear case - produces \$95
8 million more GDP impact and generates
9 1,100 more person years of employment
10 annually over the 1989 to 2009 period.

11 See that?

12 A. Yes, I do.

13 Q. So that the high nuclear case
14 generates more GDP and more employment than Case 15?

15 A. That's correct.

16 Q. And then the next paragraph:

17 Relative to Case 15, Case 24 - which
18 is the high fossil alternative - produces
19 \$115 million less GDP impact and
20 generates 1,200 less person years of
21 employment annually from 1989 to 2009.

22 Correct?

23 A. Yes.

24 Q. So that if we add those two together
25 to get from case 22, which is the high nuclear, to case

1 24, which is the high fossil, we can see that the
2 nuclear produces about \$210 million more in GDP and
3 2,300 more person years of employment than the high
4 fossil plan?

5 A. That's right. Just about makes up
6 for the St. Catharines closure.

7 Q. Right. Well, that is a good point to
8 make.

9 And that, is it fair to say, was a
10 material consideration to the authors of the GDP and to
11 Ontario Hydro in preferring a nuclear-based base load
12 generation system to a fossil generation system?

13 [10:55 a.m.]

14 A. That is correct.

15 Q. Yes.

16 A. I am still amazed at how we drifted
17 to comparing plans from comparing options, from
18 describing options, but...

19 Q. Yes, I appreciate you have to go
20 from --

21 A. At this stage, this is something that
22 we are getting ready to do in April and May, and we are
23 getting earlier discussion of it, but that is fine.

24 Q. So, if I can just summarize where we
25 have got to with respect to a discussion of fossil in

1 the DSP. On the grounds of environmental concerns,
2 available technology, cost, employment and the economy,
3 it was Ontario Hydro's judgment that a nuclear-based
4 base load option was preferable to the comparable
5 fossil option; is that not fair?

6 DR. EFFER: A. That's correct.

7 Q. And taking all of those criteria
8 together, first of all, Ontario Hydro has done no
9 similar study to date on all of those criteria, has it?

10 A. No, subsequent study. Not to the
11 degree of this study, no, certainly not.

12 Q. Based upon those area criteria it has
13 to be the remaining conclusion therefore that nuclear
14 is still - if you take all those criteria together -
15 the preferred alternative for base load vis-a-vis
16 fossil generation; am I not correct?

17 A. That's correct, yes.

18 Q. Now, Dr. Effer, I would like to turn
19 to Exhibit 40. Others have examined this document but
20 I would like to ask some further questions about it.

21 Before I go to Exhibit 40, I'm sorry, Mr.
22 Chairman, could I just look at the documents that I
23 have given to the Board that I will be discussing with
24 members the panel. There is one in there that I would
25 like to discuss before I go to Exhibit 40. I don't

1 know whether we have given an exhibit number to this
2 document yet.

3 THE CHAIRMAN: No, we haven't. Can you
4 just identified it, please?

5 MR. HEINTZMAN: Can we call it AECL
6 materials, or Materials for Use During AECL
7 Cross-Examination.

8 THE CHAIRMAN: These are the two packages
9 that we have?

10 MR. HEINTZMAN: It's the package that I
11 am looking at, it starts with Interrogatory 8.9.83, it
12 contains that interrogatory, it contains as the next
13 document at page 41, I believe all of the pages --

14 THE CHAIRMAN: But it will run through to
15 page 43, that package?

16 MR. HEINTZMAN: Yes.

17 THE CHAIRMAN: Then I have got another
18 package. It doesn't seem to be paginated.

19 MR. HEINTZMAN: The reason it's not in
20 this is because we only received it yesterday, and I am
21 happy to have it marked as part of the same exhibit.

22 THE CHAIRMAN: It's all one interrogatory
23 response, is it?

24 MR. HEINTZMAN: The second document is a
25 new interrogatory, 8.42.15.

1 THE CHAIRMAN: Right.

2 MR. HEINTZMAN: We just got this
3 yesterday so we didn't have time to include it in the
4 package.

5 THE CHAIRMAN: Let's call the package
6 exclusive of 8.42.15, the next exhibit number. What
7 number will that be.

8 THE REGISTRAR: That will be 494.

9 ---EXHIBIT NO. 494: Materials including Interrogatory
10 8.9.83 (475.28).

11 MR. SMITH: If I may, I think we may have
12 called that an interrogatory exhibit earlier this
13 morning at 475.28. I think you started to introduce
14 this information and then we all got sidetracked.

15 THE CHAIRMAN: But for reasons that are
16 not entirely clear, we double index them. We not only
17 put them in as exhibit numbers, but interrogatories
18 that are referred, they are collected in another
19 exhibit, so that people going through the transcripts
20 can find them.

21 MR. HEINTZMAN: I will be referring to
22 that interrogatory and we have already given it a
23 number.

24 THE CHAIRMAN: That's 8.9.83.

25 MR. HEINTZMAN: I think the Registrar has

1 already told us that that was...

2 THE REGISTRAR: .28.

3 MR. HEINTZMAN: .28.

4 THE CHAIRMAN: Are we on track now?

5 MR. HEINTZMAN: Yes.

6 Q. Could I ask you, members of the
7 panel, to turn to the third last page, page 41. What I
8 have done here so that I can hopefully deal with the
9 nuclear panel in a coordinated fashion is put, from the
10 thermal cost update in Exhibit 471, as the first nine
11 alternatives or options, the options that have been put
12 forth in 1991 costs for fossil generation. If you
13 could just run your eyes down those. I don't know
14 whether you are sufficiently informed as to what
15 Hydro's costs are in 1991 terms for the nuclear options
16 which will be discussed, if you are, perhaps you could
17 confirm those numbers, if not --

18 MR. SHALABY: A. I think that is outside
19 the scope this panel, Mr. Heintzman.

20 Q. All right. So can you at least
21 confirm that if the numbers that I have at options 11
22 to 15 are correct --

23 THE CHAIRMAN: Where did you get them
24 from? That's what I am not quite sure of.

25 MR. HEINTZMAN: I got them from our

1 client which will have to be proven in due course as to
2 whether these are correct numbers or not.

3 THE CHAIRMAN: So the source of numbers
4 for options 11 to 15 are from your client; is that
5 right?

6 MR. HEINTZMAN: Yes. They will only be
7 proven in evidence once someone from Ontario Hydro
8 either adopts them or I change them to what they say
9 the present numbers are.

10 THE CHAIRMAN: But this panel is not here
11 prepared to answer that question.

12 MR. HEINTZMAN: Exactly. I assume that
13 nobody would be. If somebody happened to be
14 knowledgeable about Ontario Hydro's latest estimates on
15 nuclear, then I would have taken it.

16 Q. But assuming those numbers to be
17 correct, and perhaps you can confirm as to whether the
18 nuclear option, comparing comparable option to option
19 for base load generation remains the lowest cost
20 alternative if those numbers are correct?

21 MS. KARISH: Can I just add before you go
22 on?

23 I think that Panel 9 will be giving an
24 update of the costs of the nuclear options and maybe
25 that's why it might be better for Panel 10 to make

1 these kinds of comparisons.

2 MR. HEINTZMAN: I am happy to leave it.

3 THE CHAIRMAN: That is fine. The table
4 speaks for itself, the numbers are correct and it
5 follows.

6 MR. MEEHAN: I notice that two of the
7 numbers are just slightly different than what was in my
8 Exhibit 471, the overheads, figure M12, it may only be
9 due to rounding although the first one, somebody's
10 eyeball may have gone to the wrong slide.

11 MR. HEINTZMAN: Q. Can you correct it
12 for me so we at least have a document I can show a
13 subsequent panel?

14 MR. MEEHAN: A. In option 5, the figure
15 under 10 per cent, I think 13.3 instead of 13.4. And
16 in option 9 at 80 per cent capacity factor, 4.4 instead
17 of 4.5.

18 Q. I wonder if we could determine
19 whether the thermal cost update gives us the number
20 that we have we have there rather than your numbers,
21 Mr. Meehan. I believe that the thermal cost update
22 gives us the number 13.4 for option 5 at 10 per cent,
23 and --

24 A. It gives it for option 6, 10 per
25 cent. So I think somebody maybe looked at the wrong --

1 but possibly it's rounding.

2 Q. We will check that.

3 A. But the numbers that I have used in
4 M12 were checked and double checked and the rounding
5 was done very rigourously for that slide.

6 Q. And you say the number should be 13.3
7 for option 5 at 10 per cent, and 4.4 for option 9 at 80
8 per cent?

9 A. Yes.

10 Q. Okay. Thank you.
11 Otherwise the numbers appear to be
12 correct?

13 A. For the fossil options, yes.

14 Q. Yes. Thank you.
15 Now, Dr. Effer, if I can come back to you
16 and to Exhibit 40. You were one of the authors of this
17 document; is that correct?

18 DR. EFFER: A. That is correct, for
19 portions of this document.

20 Q. If we turn to the first page of the
21 report itself, that is after the executive summary,
22 where in paragraph 1.0 there is an introduction, the
23 fourth paragraph says: This report develops a
24 corporate position on control of greenhouse gases.

25 Is that correct?

1 A. I am having trouble finding where you
2 are, sir. I'm sorry. I probably have a copy here that
3 I have been using which may not have the same page
4 numbers.

5 Q. Mine doesn't have a page number,
6 unfortunately, but I am going after the executive
7 summary which is three-and-a-half pages and then I come
8 to a page entitled Task Force on Greenhouse Effect,
9 paragraph 1.0, introduction.

10 A. Right, I am there now.

11 Q. And in the fourth paragraph it says:
12 This report develops a corporate position on control of
13 greenhouse gases.

14 Do you see that?

15 A. I do.

16 Q. Is that a correct statement?

17 A. The conclusions that are from this
18 report provide the basis for that description of what
19 the corporate position is.

20 Q. Right. So that we can look to this
21 document as being Ontario Hydro's corporation position
22 on the control of greenhouse gases; correct?

23 A. Yes.

24 Q. Yes. And the report then directs
25 itself to whether and how Ontario Hydro can meet CO(2)

1 emission standards which are projected to be in place
2 in the future; is that correct?

3 A. It presents scenarios where
4 postulated legislation and the associated restrictions
5 on CO(2) emissions can be met, yes.

6 Q. Yes. In doing so, it's Ontario
7 Hydro's position in this report that Ontario Hydro
8 should assume a leadership role in meeting those
9 emission targets; correct?

10 A. If legislation is passed on CO(2)
11 emission reductions, Ontario Hydro will take an active
12 role, a leadership role in meeting those targets.

13 Q. Well, as I read the report it wasn't
14 a question of the government mandating CO(2) emission
15 standards, but it was a question of Ontario Hydro
16 assuming a leadership role in achieving what the CO(2)
17 emissions ought to be, if you are a good corporate and
18 environmental citizen; is that not fair?

19 A. I am not aware that that position was
20 taken by the corporation in this report.

21 Q. Well, perhaps we could look to it as
22 we come through it.

23 Certainly if we go back to the prior page
24 of the conclusion of the executive summary, it's
25 recommended that Ontario Hydro, under paragraph 14,

1 participate in government efforts to control emissions
2 of greenhouse gases.

3 A. Certainly, yes.

4 Q. And assume a leadership to research
5 and analysis to increase the understanding of
6 greenhouse gases and their effects, particularly
7 regarding our own operations.

8 A. Most certainly, yes.

9 Q. So that insofar as your own
10 operations are concerned, you were to take a leading
11 role, a leadership role?

12 A. Leadership role in those areas that
13 we have stated in the conclusions, yes.

14 Q. Now, as I understand it, no other
15 study or position has been adopted by Ontario Hydro
16 since Exhibit 40; is that correct?

17 A. I'm not aware of any new position
18 that Hydro has adopted.

19 MR. SHALABY: A. May I add that the
20 State-of-the-Environment Reports that are exhibits in
21 this hearing identify emerging issues and environmental
22 issues and take a position on it, including CO(2).

23 Q. Yes. And those are consistent with
24 this position enunciated in Exhibit 40?

25 DR. EFFER: A. Yes.

1 Q. Now, a starting point for your
2 analysis, if we look at the executive summary at the
3 top of the second page, paragraph 9, is the June 1988
4 Changing Atmosphere Conference held here in Toronto;
5 correct?

6 A. Yes.

7 Q. I have a copy of the executive
8 summary of that document and I believe we have handed
9 that out.

10 I am wondering if that could be the next
11 exhibit.

12 THE REGISTRAR: Which one is that, Mr.
13 Heintzman?

14 MR. HEINTZMAN: It's entitled, The
15 Changing Atmosphere: Implications for Global Security,
16 Conference Statement, Toronto, Ontario, Canada, June
17 27-30, 1988.

18 THE REGISTRAR: Thank you. It will be
19 495.

20 THE CHAIRMAN: Thank you.

21 ---EXHIBIT NO. 495: Document entitled: The Changing
22 Atmosphere: Implications for Global
23 Security, Conference Statement, Toronto,
Ontario, Canada, June 27-30, 1988.

24 MR. HEINTZMAN: Q. If we turn to page 1
25 under summary, just after the forward. The document

1 starts off by saying, and I would like to just quote
2 it:

3 "Humanity is conducting an unintended,
4 uncontrolled globally pervasive
5 experiment whose ultimate consequences
6 could be second only to a global nuclear
7 war. The Earth's atmosphere is being
8 changed at an unprecedented rate by
9 pollutants resulting from human
10 activities, inefficient and wasteful
11 fossil fuel use and the effects of rapid
12 population growth in many regions. These
13 changes represent a major threat to
14 international security and are already
15 having harmful consequences over many
16 parts of the globe.

17 Far-reaching impacts will be caused by
18 global warming and sea-level rise, which
19 are becoming increasingly evident as a
20 result of the continued growth in
21 atmospheric concentrations of carbon
22 dioxide and other greenhouses gases.
23 Other major impacts are occurring from
24 ozone-layer depletion resulting from
25 increased damage from ultra-violet

1 radiation. The best predictions
2 available indicate potentially severe
3 economic and social dislocation for
4 present and future generations, which
5 will worsen international tensions and
6 increase risk of conflicts between and
7 within nations. It is imperative to act
8 now."

9 Now, that was the statement that was made
10 at this conference; is it not, sir?

11 DR. EFFER: A. Yes.

12 Q. And the next paragraph says, these
13 were the major conclusions.

14 Did Ontario Hydro attend this conference,
15 do you know, representatives of Ontario Hydro?

16 A. I know I didn't. I don't know who
17 did. Maybe other members of the panel can help me
18 there.

19 MR. SHALABY: A. I seem to remember
20 that, yes, Hydro was represented.

21 Q. The thing that this conference did,
22 if you go down to the fourth paragraph it called upon
23 governments, as we can see, to take specific action to
24 reduce the impending crisis caused by the pollution of
25 the atmosphere. That was the basic message of this

1 conference.

2 DR. EFFER: A. That is correct, yes.

3 Q. And as the next paragraph says, to
4 work urgently towards a action plan for the protection
5 of the atmosphere; right?

6 [11:15 a.m.]

7 A. That is correct, yes.

8 Q. I think we can take this document as
9 read, but if we could come forward to the paragraph
10 Climate Warming, on the next page, page 2, and there it
11 is stated that there has been an observed increase of
12 globally average temperature of .5 per cent centigrade
13 in the past century, which is consistent with
14 theoretical greenhouse gas predictions. And I think
15 you have already told us in your evidence that that has
16 been observed by scientists?

17 A. The measurements are not in doubt.
18 It is the connection between the greenhouse effect
19 which is in question.

20 Q. Right. Certainly, this conference in
21 the next sentence concluded that, if continued, the
22 concentrations of greenhouse gases will probably result
23 in a rise in the mean surface temperature of the earth
24 of 1.5 to 4.5 centigrade before the middle of the next
25 century. And I think you have told us in evidence that

1 the estimates of rise in temperature are not
2 necessarily as certain as is stated there?

3 A. This conference is four years old,
4 and I think the models have become more sophisticated,
5 as I have said in my direct evidence, yes.

6 Q. But still, the connection between
7 carbon dioxide and greenhouse gases still remains
8 undoubted -- sorry, between carbon dioxide and warming
9 of the atmosphere remains undoubted?

10 A. As I said in my direct evidence, the
11 only firm evidence is that carbon dioxide levels have
12 increased. There is no question about that in the
13 scientific community.

14 There is some disagreement at present on
15 whether the recorded half-a-degree rise over the last
16 hundred years globally, can with confidence be
17 attributed to the rise in carbon dioxide levels.

18 Q. But the balance of opinion, is it not
19 fair to say, is that there is a concern about carbon
20 dioxide because of this effect?

21 A. Yes. Yes, that's true.

22 Q. Now, I would like you, then, to turn
23 to page 5 of the document to tie in the statements of
24 this conference to your report, Exhibit 40, and if we
25 look under the heading Actions by Governments and

1 Industry to the third bullet, it says:

2 Set energy policies to reduce the
3 emissions of CO(2) and other trace gases
4 in order to reduce the risks of future
5 global warming. Stabilizing the
6 atmospheric concentrations of CO(2) is an
7 imperative goal. It is currently
8 estimated to require reductions of more
9 than 50 per cent from present emission
10 levels.

11 The 50 per cent reduction is then carried forth into
12 your report in the third alternative or third scenario
13 that you examined, which we will be looking at in a
14 moment; is that not correct?

15 A. Yes, that scenario three was the
16 basis for taking this data, yes.

17 Q. Right. And then the next paragraph
18 says:

19 Reduce CO(2) emissions by
20 approximately 20 per cent of 1988 levels
21 by the year 2005 as an initial global
22 goal.

23 And then the last sentence in that paragraph:

24 About one-half of this reduction
25 would be sought from energy efficiency

1 and other conservation measures. The
2 other half should be effected by
3 modifications in supplies.

4 A. Yes, I see that.

5 Q. That is again where your scenarios
6 one and two come from in Exhibit 40; correct?

7 A. That's correct, yes.

8 Q. Yes. And modifications in supply
9 would include such things as switching from fossil to
10 nuclear generation?

11 A. That was one of the options, yes.

12 Q. Right. So then let us turn, if we
13 could, back to Exhibit 40, and in scenarios one and two
14 on page 2 of the summary in paragraph 9 and then in the
15 body of the document, you examined these two first
16 scenarios; that is, reduction by Ontario Hydro of 20
17 per cent from 1988 levels in CO(2) emissions and a
18 reduction by the provincial economy of 20 per cent from
19 1988 levels by 2005 in each case?

20 A. Yes, that is correct.

21 Q. In terms of a likely regulatory
22 scenario would you not agree with me that if a
23 reduction in CO(2) levels is a desirable objective that
24 the Ontario government is going to impose this on the
25 economy generally, not just on Ontario Hydro?

1 A. I can't speak for the regulatory
2 agencies, but I would expect that that would be the
3 case.

4 Q. Yes. So in setting forth the
5 scenarios what you and your fellow authors tried to do
6 was plan for these likely scenarios so that Ontario
7 Hydro could be ready at least from a planning
8 standpoint to meet them?

9 A. Correct.

10 Q. Just stopping there for the moment,
11 it is fair, is it not, that you have told us that if
12 Ontario Hydro pursues the Update that it cannot meet
13 the targets that it set for itself in Exhibit 40?

14 A. Towards the end of the planning
15 period, that is correct. Right.

16 Q. Right. Would you agree with me that
17 from an environmental standpoint that is not an
18 acceptable result?

19 A. Insofar as we are setting a target,
20 it is unfortunate that we are not able to meet that
21 target.

22 Q. Unfortunate, and from your standpoint
23 as an environmentalist it is not acceptable, is it.

24 A. I can speak from a person who has to
25 meet regulatory requirements, and, on the other hand,

1 one who is environmentally concerned.

2 I think the body of the information in
3 our report here puts Ontario Hydro's emissions in
4 proportion to global emissions, and this slight
5 exedance will not be large, and I think we have to make
6 sure that other contributors to CO(2) are by that time
7 conforming to international agreements and protocols.

8 By that time, I think if regulatory
9 constraints were in place then that would be of
10 concern, yes.

11 Q. Well, if I can understand the answer,
12 Ontario Hydro has set a target, the target was set
13 after a good deal of consideration, the target is a
14 worthwhile and valid environmental objective, correct?

15 A. I should mention that that target is
16 not the same that is being adopted by Environment
17 Canada and the Canadian government.

18 Q. Fine. I appreciate that, but the
19 target was set by Ontario Hydro?

20 A. For this exercise, yes.

21 Q. Yes. And it was a valid
22 environmental objective?

23 A. At that time it was a regulatory
24 supposition, and that was the basis for the scenario
25 and the planning work done to meet these various

1 scenarios.

2 Q. Yes. And do you still believe that
3 it is a valid environmental objective, yourself?

4 A. I'm sorry? What objective is that,
5 I'm sorry?

6 Q. To restrain CO(2) emissions as set
7 forth in this document, Exhibit 40?

8 A. Yes, I think it is a reasonable
9 objective to meet the Ontario government's target,
10 which is stabilize emissions by the end of the century
11 based on 1990 emissions, which is slightly different
12 from the bases that we used in this study here.

13 Q. And the Update will not achieve those
14 objectives in either form, will it, as I understood
15 your evidence previously?

16 A. That is correct.

17 Q. Would you not agree with me that from
18 an environmental standpoint that is not an acceptable
19 result?

20 A. I think I have been asked that
21 before, and I say it is not acceptable from a
22 regulatory point of view. I think a slight exedance of
23 that target from an environmental point of view is
24 probably inconsequential.

25 Q. I see. Well, there are ways in which

1 the Update could be changed in order that the CO(2)
2 emission levels could be reached; is that not correct?

3 A. Yes, that is true.

4 Q. Yes. So that if, for instance, the
5 fossil plant lives were not extended, if the NUG
6 program was replaced with nuclear generation, then the
7 CO(2) emissions could be achieved, couldn't they?

8 A. Yes, within the assumption that the
9 time frame for getting those nuclear facilities in
10 place, yes.

11 Q. Sorry, what do you mean by that? I
12 mean, if approval was given to proceed with nuclear
13 generation?

14 A. Within the time constraints of
15 getting approvals for new generation and that nuclear
16 power could be approved within that time frame, yes.

17 Q. Yes. Has Ontario Hydro done any
18 further study - and we will come to the one that is in
19 Exhibit 40 - to show how you could change the Update to
20 make those changes so that CO(2) emissions, and indeed
21 the other emissions that you referred to, could be
22 lessened rather than proceeding with the Update in its
23 present form?

24 A. Excuse me. Are you asking me for
25 work having been done in addition to the Update--

1 Q. Yes.

2 A. --to support the idea that the CO(2)
3 emissions can be maintained below the target?

4 Q. Yes.

5 A. No, we haven't done any studies.

6 Q. All right. So, the Update tells us
7 that our demand will be different - that is what we are
8 told - as a result of changing views of the economy and
9 more demand management, and we are told that we can
10 meet that lessened demand in certain ways, which
11 includes extension of the fossil plants, non-utility
12 generation, et cetera, which results in the CO(2)
13 emissions not being met.

14 But what you are telling me is that
15 Ontario Hydro has not studied alternative methods to
16 achieve that new demand requirement which would result
17 in the CO(2) emission standards being met. That is
18 fair?

19 A. That's correct, yes.

20 MR. SHALABY: A. However, we indicated
21 ways that CO(2) emissions can be reduced, Appendix C of
22 Exhibit 452. Dr. Effer mentioned that portion before
23 and many of us visited that appendix at various times.

24 We are directionally saying what measures
25 would move CO(2) emissions down.

1 I think what Dr. Effer is saying that we
2 haven't done, to our knowledge, numerical calculations
3 to show if you increase demand management by this much
4 it goes down that much.

5 But we know there are levers to pull and
6 push that would reduce CO(2).

7 Q. Nor have you done any analysis of
8 other methods such as more nuclear generation and to
9 then work it out to see -- or other alternatives to see
10 whether the CO(2) emissions and other emissions would
11 be thereby lessened; am I correct?

12 A. To our knowledge, not numerical
13 calculations.

14 DR. EFFER: A. But with the Update we
15 have shown here that the nuclear option will scrape
16 under the target. So to that extent, we have done the
17 study to show the effects of incorporating nuclear
18 power.

19 Q. Well, you mean in figure C-5?

20 A. Yes.

21 Q. Yes. But that is using the DSP
22 analysis, is it not, in that line that we see, Nuclear
23 Option?

24 MR. SHALABY: A. It is using the Update.

25 Q. It is using the Update in terms of

1 the economy, the amount of energy and power that we
2 will require, et cetera. But in terms of any analysis
3 it is using the nuclear information obtained from the
4 DSP, is it not, or has a new study been done about how
5 generation can be adopted to a nuclear alternative to
6 meet the demand scenario in the Update?

7 If so, I haven't seen it.

8 A. I am not sure I understand what it is
9 that you are looking for.

10 Q. Well, the DSP contains a
11 comprehensive analysis of the nuclear option vis-a-vis
12 the fossil option.

13 As I understood the DSP, there is no
14 analysis of the nuclear option, and primarily the
15 authors say at the beginning of the report because of
16 the moratorium placed upon nuclear generation by the
17 provincial government. That is the way I read the
18 document.

19 A. Well, I accept what you are saying
20 then.

21 Q. And if we look at figure C-5, the
22 illustrative targets shown there - and I was going to
23 come to this later - does not allow for a 20 per cent
24 reduction, does it.

25 DR. EFFER: A. That is the maintaining

1 of the 1990 levels, yes.

2 Q. Yes. Of course, a reduction by 50
3 per cent would be a lower line than even that.

4 A. Yes.

5 Q. Right. And the lines that we can see
6 running across the page where it says Updated Plan or
7 Enhanced, do not provide for bringing on new nuclear
8 generation early with a view to reducing those lines,
9 do they?

10 A. That's correct, yes.

11 Q. And no study has been undertaken by
12 Ontario Hydro of that alternative, has it?

13 A. Of bringing a nuclear option forward?

14 Q. Yes. Other than what we have seen in
15 the original Demand/Supply Plan?

16 A. Yes. Other than that, yes.

17 MR. HEINTZMAN: Yes. Do you wish to take
18 a break, Mr. Chairman?

19 MR. MEEHAN: Mr. Chairman, perhaps before
20 you do you will permit me to get my foot out of my
21 mouth?

22 It seems the only time I spoke this
23 morning was with reference to those numbers. In fact,
24 the numbers that Mr. Heintzman has in his table have
25 been transcribed correctly from the thermal update of

1 cost.

2 The numbers I used, I guess, were more
3 rigorously rounded, and in this event consistency would
4 have been better than rigour, I'm sure.

5 THE CHAIRMAN: Thank you, Mr. Meehan. We
6 will take a break now for 15 minutes.

7 THE REGISTRAR: This hearing will recess
8 for 15 minutes.

9 ---Recess at 11:34 a.m.

10 ---On resuming at 11:50 a.m.

11 THE REGISTRAR: Please come to order.
12 This hearing is now in session. Be seated, please.

13 MR. HEINTZMAN: Q. Dr. Effer, if I could
14 take us back to Exhibit 40, to the executive summary,
15 page 2, paragraph 10. The model that this report
16 envisages to accomplish, the reduction in CO(2) levels
17 by the year 2005, was stated to be in the first
18 sentence, as I understand it, 11 terawatthours of
19 efficiency improvements, 8 terawatthours of additional
20 NUGs, 3.5 terawatthours of new hydraulic, and 25
21 terawatthours from a new nuclear station.

22 DR. EFFER: A. That's correct.

23 Q. And that new nuclear station is over
24 and above Darlington?

25 A. Yes, that is true.

1 Q. That paragraph concludes by stating
2 that if the output from the new nuclear station were
3 replaced with fossil generation, and even a high
4 efficiency combined-cycle natural gas facility, the
5 emission standards could not be met in 2005?

6 A. Correct.

7 Q. Now, if we come to the conclusions on
8 the next page, the first conclusion is that:

9 The evidence that greenhouse gases are
10 increasing is overwhelming and there are
11 predictions that this will lead to global
12 warming. However, the timing, the rate
13 of warming and the distribution of its
14 effects are very uncertain.

15 That conclusion still remains true; does
16 it not?

17 A. Yes.

18 Q. The third paragraph --

19 THE CHAIRMAN: Perhaps I am missing
20 something. I thought you said that there is an
21 increase in greenhouse gases, there is no dispute,
22 but there was a dispute as to whether it contributed to
23 global warming.

24 MR. HEINTZMAN: It says there are
25 predictions that this will lead to global warming.

1 THE CHAIRMAN: I see. All right.

2 MR. HEINTZMAN: Q. I think the paragraph
3 is predicated on that prediction.

4 DR. EFFER: A. Yes.

5 Q. And the uncertainty of the timing and
6 the rate and the distribution.

7 A. Correct, yes.

8 Q. Then the third paragraph says:

9 If the increase in greenhouse gases is
10 to be controlled, most sectors of the
11 economy, not only Ontario Hydro and the
12 utility industry, and most governments
13 around the world, not only Canadian, must
14 participate in measures to reduce
15 emissions of the gases.

16 That conclusion remains true; doesn't it?

17 A. Yes, it does.

18 Q. And then dropping down about six
19 paragraphs:

20 The currently practical methods for
21 reducing emissions of greenhouse gases
22 include... And the third is: Shift to
23 non-fossil energy sources mostly
24 delivered by electricity.

25 That remains correct; does it not?

1 A. Yes, that item is in the included
2 options.

3 Q. Yes. And then dropping down two
4 further paragraphs.

5 Ontario Hydro can meet a 20 per cent
6 reduction in CO(2) emissions by 2005, if
7 load growth follows the median path, if
8 economic quantities of demand management,
9 non-utility generation, and hydraulic
10 generation are implemented, and if a new
11 Darlington-type nuclear generating
12 station is constructed.

13 That remains true; doesn't it?

14 A. Yes.

15 Q. Yes. Next paragraph:

16 If all sectors of the economy are
17 required to reduce CO(2) emissions by 20
18 per cent by 2005, there will likely be
19 increased electrical demand even with
20 challenging efficiency improvement
21 programs and significant shifts to lower
22 carbon fuels. This could exceed Hydro's
23 ability to build non-fossil generation.

24 That remains true; doesn't it?

25 A. Yes.

1 Q. What the authors are saying, and this
2 is elaborated and I want to expand on it, is that if
3 other sectors of the economy are required to reduce
4 their CO(2) standards, they are going to have to shift
5 out of fossil generation and into the use of
6 electricity, and if it's electricity based upon nuclear
7 generation, then Hydro is going to have to build
8 nuclear generation, i.e., non-fossil generation. That
9 is what that paragraph is telling us?

10 A. It would place a greater demand on
11 the three practical methods referred to in your earlier
12 question.

13 Q. Right. And it will therefore result
14 in a higher load growth in the future than would
15 otherwise be the case?

16 A. That is correct.

17 Q. And that's what the next paragraph
18 addresses itself to:

19 The following elements in Ontario
20 Hydro's operation and long-term planning
21 aid in the reduction of greenhouse gas
22 emissions.

23 And dropping down to the fourth and
24 fifth:

25 Maintain CANDU nuclear option and

1 preserve flexibility to meet upper load
2 growth.

3 Do you see that?

4 A. Yes, I do.

5 Q. And those statements remain true?

6 A. Those are the correct descriptions of
7 the element required, yes.

8 Q. And the statement "preserve
9 flexibility to meet upper load growth" means that - and
10 we will see this as you expand it in the report - if
11 you are going to impose CO(2) standards, or indeed
12 other standards, upon other elements of the Ontario
13 economy, which are predicted, as you do, to result in
14 higher electricity use, then you had better plan to the
15 upper in order to meet that electricity demand;
16 correct. That's what the authors are telling us?

17 A. That is what the authors are telling
18 us, yes.

19 Q. Yes. Now, if we can go over then to
20 the specific scenarios. I would like to take you to
21 page 7 of the actual report, which starts to study
22 scenario one, which is a scenario in which only Ontario
23 Hydro is required to reduce CO(2) emissions to 80 per
24 cent of 1988 levels by 2005, and we can see that
25 heading about halfway down page 6.

1 I would like to take you to the top of
2 page 7 where the authors are discussing how demand
3 management and load shifting will impact on this
4 scenario. Starting with the first sentence:

5 Currently it is estimated that 2,000
6 megawatts of economic demand reduction
7 can be gained through incentive-driven
8 efficiency improvement programs by the
9 year 2000. An additional 1,000 megawatts
10 of peak reduction through load shifting
11 programs is expected to be implemented by
12 the year 2000.

13 And then dropping down to the third
14 sentence:

15 It is judged that additional load
16 shifting will have little benefit in
17 terms of reducing fossil generation
18 because there is not expected to be
19 significant amounts of surplus nuclear on
20 the bulk electricity system in the
21 future.

22 Now, what I understand the authors to be
23 telling us is, that if you want to reduce CO(2) through
24 load shifting, there is only a point in load shifting
25 if you are shifting from fossil generation to nuclear

1 generation; is that a fair statement?

2 A. Yes.

3 Q. Right. And the nuclear system is in
4 the base load generation of Ontario Hydro's system;
5 correct?

6 A. That's correct.

7 Q. Right. So load shifting is a way of
8 shifting loads from peak generation, get people not to
9 use it when everybody else is using it, to use it when
10 other people are not using it, so it will shift from
11 being part of the peak load to being part of the base
12 load; correct?

13 A. Yes, that's correct.

14 Q. Right.

15 THE CHAIRMAN: These questions are
16 getting to be quite planning-like questions. I just
17 wanted to draw that to your attention. This is not
18 what, basically, this panel is here for. You can go
19 ahead on that line, but I think you will get better
20 answers to these questions from Panel 10.

21 MR. HEINTZMAN: The issue I am addressing
22 is entirely environmental in the sense of CO(2).

23 Q. What I think we are seeing here is
24 that if you are interested in reducing CO(2) emissions,
25 load shifting will not of itself do anything for you

1 unless you are shifting from peak load to a base load
2 which is not a fossil generation. That's what the
3 authors are telling us.

4 DR. EFFER: A. That's correct.

5 Q. I will come back to that when we get
6 to the Update.

7 If we can then turn to page 10 of the
8 document, Exhibit 40, we there see the configuration of
9 the system designed to reduce CO(2) emissions in
10 accordance with this report if CO(2) emission levels
11 are reduced only on the Ontario Hydro system and not
12 throughout the Ontario economy. We can see there a
13 system in which nuclear is at 103,000 gigawatthours in
14 the year 2005, which we see from note 1 includes
15 Darlington.

16 A. That's correct.

17 Q. And we see a system in which fossil
18 generation is 15,000 gigawatthours?

19 A. With that assumption, note 2, yes.

20 Q. Note 2? Yes.

21 But that is what I will call a high
22 nuclear configuration of a system, that's 103,000
23 gigawatthours out of 153,000 gigawatthours existing
24 system, that's about two-thirds nuclear.

25 A. I'm sorry, what is your question

1 again?

2 Q. That is a high nuclear system that's
3 being described there as the existing system as of --
4 as the existing system, 103,000 gigawatthours out of
5 153,000?

6 A. Yes, that's correct.

7 Q. And we can see the nuclear from
8 additional demand/supply initiatives as 25,000
9 gigawatthours, and we have already seen in the summary
10 the 25 terawatthours of nuclear which is assumed to be
11 added to the system to meet this objective.

12 A. Yes, that is correct.

13 Q. If you turn to the top of page 11 of
14 the document, it says:

15 The fossil energy production
16 requirement estimated for 2005 is 15
17 terawatthours.

18 A. Yes, I see that.

19 Q. That's considerably less than what is
20 estimated by you as the fossil generation - estimated
21 by this panel, I should say - as the fossil generation
22 under the Update as of 2005. I think it is about 24 or
23 25 terawatthours, if we look at -- perhaps other
24 members of the panel can confirm that for me.

25 A. Yes, that's correct.

1 Q. So that the Update is not setting
2 forth a program which is consistent with this one; is
3 it?

4 A. That is correct.

5 Q. I think we can take the balance of
6 that part of the scenario as read.

7 If you come over with me to scenario No.
8 2, starting at page 14. Under this scenario all
9 sectors of the provincial economy are required to
10 reduce CO(2) emissions to 80 per cent of 1988 levels by
11 2005. And if you come with me to page 16, we see a
12 chart there that shows, on the right-hand side under
13 the heading of Increase in Electricity Demand, 35
14 terawatthours?

15 A. Yes, I see that.

16 Q. That is as a result of the Ontario
17 economy being required to use more electricity in order
18 to reduce emissions, particularly in CO(2) in this
19 case.

20 A. Yes, it is precisely that.

21 Q. And under that chart it says:

22 In summary, assuming no change in
23 electricity in natural gas prices, a 223
24 terawatthour load can be expected by
25 2005. This compares to 188 terawatthour

1 forecast in our most recent long range
2 load forecast, a 35 terawatthour or 19
3 per cent increase. The annual 2.2 per
4 cent growth rate presently forecasted for
5 the period 1987 to 2005 would increase to
6 3.2 per cent under this greenhouse
7 scenario.

8 That's correct?

9 A. Yes.

10 Q. That is one of the reasons that this
11 report says that to plan for this kind of an event you
12 should be planning to the upper; correct? The upper
13 load growth, because you are going to have an increased
14 demand for electricity in order to meet emission
15 standards?

16 A. Using the scenario 2 that is a
17 correct deduction that can be taken, yes.

18 Q. Yes. And it is because of scenario 2
19 and scenarios like it that this reports says that you
20 should maintain flexibility to maintain upper load
21 growth?

22 A. Yes, that is correct.

23 Q. And the Update is inconsistent with
24 this report to that extent, isn't it, because it speaks
25 of planning to the median?

1 A. Yes, they are mutually inconsistent.

2 MR. SHALABY: A. Maybe again we are
3 heading into the planning philosophy in the Update. If
4 government policies are to reduce CO(2) emissions
5 economy-wide, that would become the median and we will
6 plan to that median.

7 Q. That's right. That's another way of
8 saying that the demand will be higher than the median
9 presently as stated in the Update.

10 A. That's right. It will be tomorrow's
11 median and we will adjust to it. I think that is it
12 part of the philosophy adopted in the Update.

13 Q. Well, I guess that's for someone else
14 to consider, Mr. Shalaby.

15 Let's move then to scenario No. 3.
16 Again, Dr. Effer is one of the authors, but anyone else
17 may comment. Scenario 3 is looking at a scenario of a
18 reduction of CO(2) emissions to 50 per cent of 1988
19 levels.

20 DR. EFFER: A. Yes, that's the scenario
21 3, yes.

22 Q. And the authors of this report
23 prepared this scenario because of the probability that
24 CO(2) emission standards would be an increased or
25 strengthened?

1 A. We should say there are no existing
2 standards, but this is one of the scenarios postulated
3 based on possible standards.

4 Q. Is it not fair to say that the
5 authors of this report looked upon this as being a
6 probable scenario?

7 A. It was an extreme scenario bordering
8 on what might be an improbable situation.

9 Q. But it was sufficiently probable as
10 to require or merit study and placement here as one of
11 the things that may occur?

12 A. Yes. In all our studies we do have
13 worst case conditions and I think this could probably
14 have that description.

15 Q. And it derives out of the Toronto
16 conference as being what will be required in order to
17 achieve the results set forth in that conference?

18 A. That was one of the statements made
19 in the conference, yes.

20 Q. And without adieu, if we can just
21 turn to page 20 of this document, of Exhibit 40, we can
22 see from the bottom of the chart that under this
23 scenario the increased demand for electricity will be
24 76 terawatthours by 2005, and the summary just below
25 the chart tells us that.

1 [12:13 p.m.]

2 THE CHAIRMAN: 2020. Or am I wrong about
3 that?

4 MR. HEINTZMAN: Q. 2020. I'm sorry, I
5 apologize for that. 2020.

6 And the report then says in summary:
7 This would represent an increase of 76 terawatthours or
8 32 per cent of electrical load or the annual 1.9 growth
9 rate presently predicted for the period 1987 to 2020
10 would increase to 2.8 per cent under this greenhouse
11 scenario. The annual growth rate for the period 2005
12 to 2020 would increase from 1.5 per cent to 3.4 per
13 cent.

14 DR. EFFER: A. That's correct, yes.

15 Q. Again, the support for the conclusion
16 that one should plan to the upper?

17 A. Yes.

18 Q. Would you turn with me, then, to
19 Exhibit 452? And I will direct this question to either
20 Mr. Shalaby or Dr. Effer. I want to understand the
21 Update in relation to the fossil option in respect of
22 what is said on page 15 of the Update.

23 I am having trouble with the first
24 paragraph under the heading "Comparison of Need Dates
25 for Major Supply". Do you see that heading on page 15

1 of Exhibit 452?

2 MR. SHALABY: A. Yes.

3 Q. And it says:

4 Under median load growth there has
5 been a deferral of need for new major
6 supply from 2001 to 2009-2011, largely
7 attributable to increased demand
8 management targets, increased non-utility
9 generation forecasts, and the fossil life
10 extensions. Given that lead times for
11 new major base load supply facilities are
12 about ten years it can be seen that the
13 urgency that characterizes the
14 Demand/Supply Plan is no longer
15 applicable.

16 Now, my problem is that insofar as a
17 nuclear base load generation or a fossil base load
18 generation is concerned I don't see how what is said in
19 the first sentence particularly in relation to fossil
20 life extensions has anything to do with base load
21 generation, and that's the proposition I am having
22 trouble with.

23 Let's just take fossil life extensions.
24 The fossil plants are not acting, as I understand the
25 DSP, as base load generation.

1 Mr. Shalaby perhaps can answer that?

2 A. Yes. I wonder, where does the
3 difficulty arise between base load and life extension?

4 Q. Well, if the system is presently made
5 up, as I understand the DSP to be saying, of about 70
6 to 80 per cent, or 90 per cent if you are talking about
7 energy, of base load. And if your base load is going
8 to increase at some incremental amount each year, then
9 these factors - and in particular I direct your
10 attention to fossil life extensions - is not going to
11 affect your need for new base load generation; isn't
12 that correct?

13 A. No, life extension does not affect
14 the need for base load generation, except that some of
15 the life-extended facilities with the environmental
16 controls can perhaps operate at the intermediate, high
17 intermediate as Mr. Meehan referred to it.

18 Q. Again, I understood from your
19 previous evidence that that is not intended to work--

20 A. Yes.

21 Q. --the fossil plants any harder, I
22 think the word was used, any more under the extended
23 life than they are operating at present; is that not
24 correct?

25 A. Yes.

1 Q. All right. At present they are being
2 used at something under 30 per cent capacity. They are
3 not being used at anything near intermediate or base
4 load application, are they.

5 A. That's correct.

6 Q. So that the extension --

7 MR. MEEHAN: A. I think, first of all,
8 they are operated at higher than 30 per cent now. That
9 is not the point I want to make.

10 If all of our fossil generation were to
11 shift up several percentage points they would still be
12 operating in the intermediate capacity factor range, in
13 the absence of having more base load generation
14 unavailable. It is not such an exact thing, and I hope
15 I didn't paint it that way.

16 Q. Well, I wonder if we can just look at
17 a document in the DSP to get at least in graphic terms
18 what I am trying to get at.

19 If you would turn to the DSP, at page
20 3-23 is one diagram that I think helps us, and I will
21 direct my questions to Mr. Shalaby and to Mr. Meehan as
22 apparently the most familiar with this subject.

23 At that page we see at the top under
24 figure 3-21 the hourly load in gigawatts that the
25 Ontario Hydro systems operates under during the yearly

1 load of 1988; right?

2 A. That's right.

3 Q. That has been put for us into a
4 convenient graph at the bottom of the page, figure
5 3-22, showing us the amount of base load, the amount of
6 intermediate load and the amount of peak load?

7 A. That's true.

8 Q. We can see that 70 per cent of the
9 load capacity is base load, being the brown area at the
10 bottom of the page?

11 A. I don't know whether that is 70 per
12 cent of the load, but I think the 70 refers to the 70
13 per cent of the hours in the year that is shown there.

14 Q. Yes?

15 A. That is identified as base load.

16 Q. Then we can see, if we look at the
17 graph at the top of the page, that at about -- look
18 about...14 gigawatts. We can see that the base load is
19 basically running up from that as intermediate or peak
20 load; right?

21 A. Well, I think it is for sure to say
22 that the point mark median would be the point that is
23 100 per cent of the time -- pardon me, minimum, the
24 point that if you were to come across at 8-1/2 perhaps,
25 and you can say that that is the 100 percentage point.

1 If you are wanting to find the 70
2 percentage point it is not easy to see it from the top
3 figure.

4 Q. But we have read a lot in the DSP
5 about the fact that there are three different kinds of
6 generation that we think of that gradate one into the
7 other, but they are basically base load, intermediate
8 load, and peak load?

9 A. Yes. And I think I have said that
10 intermediate load would operate between 20 and 60 per
11 cent, and above 60 per cent we would classify that as
12 base load.

13 Q. If I can find it, there is a chart
14 that tells us that the fossil generation is operating
15 at about 29 per cent, so it is definitely not anywhere
16 near the base load.

17 A. Which chart is that?

18 Q. I am just going to try to find it for
19 you.

20 A. I think on the bottom of page 4-3
21 there is a pie chart there that might suggest that coal
22 is 29 per cent. But that is talking about capacity,
23 not energy production, if that is --

24 Q. No, there is -- sorry, page 4-7, the
25 chart on page 4-7 of Exhibit 3 shows us the deployment,

1 as I understand it, of the coal -- fossil-coal at 29
2 per cent, and if you read to the right of that in the
3 writing it says:

4 Hydro operates its generating
5 capacity so that the lowest variant cost
6 generation (hydraulic) is used to its
7 fullest extent. The next lowest variant
8 cost (nuclear) is used to the extent
9 possible, and the most expensive,
10 (fossil) is used only as required to meet
11 peaks in demand.

12 That is the general planning philosophy of Ontario
13 Hydro?

14 A. Yes, that's true. It does say 29 per
15 cent annual capacity factor for the year 1993 as it was
16 seen at that time.

17 Q. Yes.

18 A. It is higher than that today. I
19 think that is what has been bothering us here.

20 Q. But it is not anywhere near base load
21 power, is it?

22 A. Now?

23 Q. Yes.

24 A. No, some of it is operating in the
25 high intermediate range.

1 Q. But going back to the statement --

2 A. Under 60 per cent capacity factor for
3 sure.

4 Q. The statement that I am concerned
5 about is that the fossil life extensions have very
6 little to do with whether Ontario Hydro requires new
7 base load power.

8 MR. SHALABY: A. Yes, but the statement
9 in 452, page 15, that you are referring to says that
10 there has been a deferral of the need for new major
11 supply. It didn't say "base load"; it says "new major
12 supply". And new major supply includes peaking power
13 and intermediate power.

14 Q. Then let's focus on base load power.

15 A. It is only a component of --

16 MR. SMITH: A. We just said not focus on
17 base load power.

18 MR. SHALABY: A. Yes.

19 Q. I'm sorry?

20 MR. SMITH: A. Mr. Shalaby just said,
21 don't focus on base load power. We don't build only to
22 meet a base load; we build to meet the load in total of
23 the system.

24 Q. Correct.

25 MR. SHALABY: A. I am having difficulty

1 linking the deferral to base load. That is what I am
2 asking a little bit more help in.

3 Q. Let's look back at page 4-5 of
4 Exhibit 3, the chart that we saw there for 19 -- oh,
5 that is one place we see that chart. Or 3-23 I think
6 is where we were looking being at it before.

7 A. 3-dash...?

8 Q. 3-23 of the DSP?

9 A. Yes. I am sitting here and looking
10 at your Exhibit 3 and wondering what lawyers did before
11 the invention of the yellow stickie.

12 Q. I know every one of them off by
13 heart, Mr. Shalaby.

14 A. The hearing will take twice as long
15 without the invention of the yellow stickies.

16 THE CHAIRMAN: But we are dealing with
17 your favourite diagram, though.

18 MR. SHALABY: Yes. Thank you for
19 remembering, Mr. Chairman.

20 MR. HEINTZMAN: Q. Ontario Hydro has to
21 plan for the future of its base load requirements,
22 doesn't it?

23 MR. SHALABY: A. That is correct.

24 Q. So as much as anything else, and in
25 fact I would say more than almost anything else, it

1 would have future estimates of the amount of base load
2 that it will need not just for 1988 but in the future?

3 A. Yes, and -- well, just -- I think
4 chapter 15 indicates what the base load, median load,
5 and peaking requirements will be into the future. If
6 you go to 15-5, figure 15-5, on page 15-5
7 coincidentally, will attempt to do exactly that.

8 Now, it is not an exact science, and, as
9 Mr. Smith and Mr. Meehan and yourself say, there are
10 grey areas between what a particular generating station
11 would do. It can be pushed up and down the duty
12 ladder.

13 But yes, we attempt to do that. We
14 attempt to predict what the base load requirements
15 would be, and what the intermediate, and what the
16 peaking will be. That is exactly what we did in
17 chapter 15.

18 Q. There is nothing in the Update that
19 tells us what Ontario Hydro's projections for increases
20 in base load power and energy is, is there?

21 A. No, there isn't.

22 Q. So even though you extend the fossil
23 plants that doesn't mean that you won't need additional
24 base load capacity, does it?

25 A. It does not mean that.

1 Q. I am suggesting to you that the DSP
2 tells you that you are going to need additional base
3 load capacity energy, doesn't it, if you believe that
4 document?

5 A. Exhibit 3?

6 Q. Exhibit 3.

7 A. That is correct.

8 Q. And there is nothing in Exhibit 452
9 that tells you to the contrary, is there?

10 A. No, there isn't.

11 Q. All right.

12 MR. SMITH: A. I am having a lot of
13 trouble with this. Perhaps this is a--

14 MR. SHALABY: A. This is a --

15 MR. SMITH: A. --planning issue, but if
16 you don't need any more resources to meet peak and you
17 have enough resources to meet peak, then you can use
18 the resources that you have to meet all your loads
19 whether they are base load, intermediate load or
20 otherwise. You can use the resources that you have.

21 So, you wouldn't build a resource only to
22 meet some apparent increase in the amount of time you
23 would run your resources, all other things remaining
24 equal.

25 You have to take a lot of factors into

1 account, but you don't necessarily build for base load.
2 If we don't need any capacity for peak load, then we
3 have enough resources to run more hours of the year to
4 meet loads that are perhaps going up, as your
5 characterization of base load is.

6 So you don't necessarily need to build
7 anything, and, in fact, you would have to stretch it a
8 long way to in fact build just for that purpose. You
9 would have to then be deciding to replace an existing
10 resource.

11 DR. CONNELL: Wouldn't you have to exempt
12 peaking hydraulic from that generalization, Mr. Smith?

13 MR. SMITH: Yes, you can't get any more
14 out of a peaking hydraulic, but certainly you can get
15 more out of the coal-fired plants, for example, and the
16 oil-fired plants that we have, quite a lot more out of
17 them. If we are currently running at, say, an average
18 of a 40 per cent capacity factor they could be run to
19 achieve an 80 per cent capacity factor.

20 MR. MEEHAN: And for a time that could be
21 the economic thing to do.

22 MR. HEINTZMAN: Q. Well, what you are
23 saying is you could convert intermediate or peaking
24 load and use it as base load and run it all the time;
25 is that what you are saying?

1 MR. SMITH: A. There is no conversion
2 required.

3 Q. No, but you could use a unit that was
4 designed to run as peaking power and just run it all
5 the time as base load. Is that what you are saying?

6 MR. MEEHAN: A. Yes, exactly.

7 Q. Well, I suppose you could do that,
8 but it would be much more expensive than building base
9 load power, or it could be more expensive, depending
10 upon the analysis?

11 A. It could be, and these are the things
12 that planning people do when they are looking at the
13 type of generation that they would select for future.

14 Q. Right. All I am saying is that the
15 mere fact that you have fossil life extensions does not
16 tell you, (a), what your future base load will be, and
17 (b), what is the prudent way to satisfy that base load,
18 does it?

19 A. Not in itself, but, if you recall, --
20 and maybe we can get off this point, but in my direct
21 evidence I think I said that life extensions merely
22 extended the need date by one year. It did very little
23 more than that.

24 Q. Yes. I understood that.

25 A. And so in the sentence it is in, it

1 is the minor part of the three items that are
2 referenced there. The non-utility generation and
3 demand management have a far bigger impact on what it
4 is we are talking about. Both of those are high
5 capacity factor alternatives, so to speak.

6 THE CHAIRMAN: Well, aren't we really
7 getting into Panel 10 issues right now?

8 MR. MEEHAN: I think so.

9 MR. HEINTZMAN: Well, except that it
10 bears on fossil generation. The whole issue I am
11 seeking to elicit from this panel is whether this
12 statement is a correct statement in terms of --

13 THE CHAIRMAN: Well, I think they have
14 said that the life extensions will not affect the need
15 for base load. I think they have said that.

16 MR. HEINTZMAN: All right.

17 THE CHAIRMAN: Or something like that.

18 But certainly we can talk about
19 characteristics of fossil options and comparison of
20 those characteristics or characteristics of other
21 option, but I think when we get into what the needs are
22 and what the planning is that is probably better
23 answered in Panel 10, and anything that Panel 10 says
24 about that will have to supersede what was said at this
25 Panel.

1 MS. KARISH: Mr. Chairman, I would only
2 add that you mentioned Exhibit 452B which was filed
3 this morning which contained updates to the figures
4 from chapters 3 to 12 of the DSP report, Exhibit 3, and
5 the covering letter that went out with that also states
6 that updated figures from chapters 15 and 16 of Exhibit
7 3 will be available in the next few weeks. So in fact,
8 figure 15-5 may be updated in the next few weeks. That
9 might answer some of my friend's questions.

10 MR. HEINTZMAN: I see.

11 THE CHAIRMAN: Thank you, Ms. Karish.

12 MR. HEINTZMAN: I will put this question
13 out, Mr. Chairman, and I won't pursue it if the Panel
14 feels it is better dealt with at a subsequent panel.

15 But the question I asked of Dr. Effer and
16 Mr. Shalaby previously about load shifting I suggest
17 applies when we consider the words "demand management
18 targets" in that sentence, because to the extent that
19 demand management is accomplished through load shifting
20 it doesn't reduce the need for base load generation,
21 fossil. In fact, it may increase the need for base
22 load - in terms of your panel, fossil - by shifting
23 peaking demand to smooth out the curve and make it a
24 more constant and therefore base load issue.

25 Is that not fair?

1 [12:30 p.m.]

2 MR. SHALABY: A. To the extent the words
3 "demand management" include load shifting, you are
4 correct. But the majority of demand management is
5 efficiency and fuel shifting; it's not load shifting.

6 Q. I would like to discuss for a few
7 minutes the provincial government's Clean Air Program.
8 Dr. Effer, you may be the one most familiar with this
9 program. I believe we have handed to you a document,
10 and to the Panel, which describes the Clean Air
11 Program.

12 THE CHAIRMAN: Is that the one Stopping
13 Air Pollution At its Source. Is that it?

14 MR. HEINTZMAN: Yes.

15 THE CHAIRMAN: Could we have an exhibit
16 number?

17 THE REGISTRAR: 496, Mr. Chairman.

18 ---EXHIBIT NO. 496: Document entitled: Stopping Air
19 Pollution At Its Source.

20 MR. HEINTZMAN: Q. You are familiar with
21 the Clean Air Program, are you, Dr. Effer?

22 DR. EFFER: A. Yes, I am.

23 Q. As I understand it, this program has
24 not yet been brought into law but it is the most
25 current view of the Ministry of the Environment as to

1 where it would go in the next generation of
2 environmental controls; is that a fair statement?

3 A. That was the view at the time of
4 publishing this Clean Air Program, yes.

5 Q. Yes. And while it hasn't been
6 introduced yet as law, it is still the only proposal
7 for moving to a new system that has been put out by the
8 Ministry of the Environment?

9 A. On air pollution, yes.

10 Q. Yes. It works by regulating the
11 emission at the source, that is when it comes out of
12 the smoke stack or somewhere, rather than at a point of
13 impingement where the emission hits the ground; is that
14 correct?

15 A. That is one of the basic shifts in
16 the Ministry's points of view, yes.

17 Q. That is why it's called Stopping Air
18 Pollution At Its Source?

19 A. That's correct, yes.

20 Q. As I understand it the Clean Air Acts
21 of the United States of which we read in the newspaper,
22 have the same approach as the approach set forth in
23 this Clean Air Program; is that correct?

24 A. Yes, there are a lot of similarities.

25 Q. And besides working on the point of

1 emission, this program works on levels of concern. And
2 if you would turn with me to page 2 of the document
3 itself, which comes after a table of contents which you
4 will find about four or five pages into the document,
5 there is a table of contents and then there is a page
6 that tells us Level of Concern 1, Level of Concern 2,
7 Level of Concern 3.

8 A. What page are you on now?

9 Q. It's page 2, the bottom of the page,
10 but it comes after the overview which goes on for
11 some--

12 A. Yes, I have it now.

13 Q. --number of pages. Then you come to
14 a table of contents and then to a heading General
15 Principles.

16 As I understand it, the way this system
17 works is that you divide the contaminants into three
18 levels, high hazard, significant concern and moderate
19 concern?

20 A. That is correct, yes.

21 Q. And Level of Concern 1 is the high
22 hazard, and the control is that - and we can read it in
23 the fifth line - the strictest controls required
24 anywhere in the world are to be used.

25 A. Yes, I see that.

1 Q. That is the general philosophy of
2 Level 1, that you have got to put onto your source of
3 emission the strictest controls available anywhere in
4 the world, and while you can look to economic factors
5 for timing, you can't look to economic factors for not
6 putting in the equipment or the program?

7 A. Yes, that's right.

8 Q. And the kinds of things that would
9 fall within that Level 1 are the toxic air emissions
10 that we heard about in this hearing, including arsenic
11 and cadmium, chromium and lead, nickel, these kind of
12 things that come out of a coal-fired generating
13 station?

14 A. I think the listing is a little more
15 restrictive than you just mentioned in your examples
16 and does contain others other than you have mentioned.

17 Q. Yes.

18 A. I don't think your examples were
19 truly representative of the list.

20 Q. But I think you have gone over this
21 in --

22 THE CHAIRMAN: They are listed on page 6;
23 is that right? Or maybe not. Maybe I am wrong.

24 DR. EFFER: Yes.

25 THE CHAIRMAN: I may be wrong about that.

1 DR. EFFER: No, that is correct. That is
2 the initial list of Phase 1 chemicals, on page 6.

3 MR. HEINTZMAN: Q. I believe there was a
4 prior exhibit that was filed where you listed many of
5 the air toxins that are generated from the fossil
6 plants, and I don't want to go over that. But
7 basically the air toxins fall into concern Level No. 1;
8 is that not correct?

9 DR. EFFER: A. Not entirely. Those are
10 classified as air toxics, but to my knowledge have not
11 been categorized at the moment into Category 1 one of
12 the Clean Air Program.

13 I am not overly clear on that point, sir.

14 Q. I may look at that over lunch time.
15 I hope to finish before then, but my friend will
16 continue over lunch.

17 Level 2 concern requires, as we see from
18 about the 5th line:

19 The best controls demonstrated in use
20 anywhere in the world, taking into
21 consideration economic factors.

22 So in this case you have to use the best
23 controls demonstrated anywhere in the world, but in
24 mitigation or alleviation you can plead economic
25 factors.

1 A. That is correct.

2 Q. And as I understand it, Level 2 would
3 apply to things like SO(2), NOx and those kinds of
4 emissions; is that your understanding?

5 A. They would, in discussions with the
6 Ministry, those emissions would fall into that
7 category, but initially the control of the emissions
8 would be still residing under Regulation 281, the acid
9 gas regulation.

10 Q. Yes. But if this program comes into
11 effect and applies to Ontario Hydro, then Ontario Hydro
12 is going to have to meet the requirements for Level 2
13 emissions.

14 A. If it comes into effect and
15 supersedes Regulation 281, yes.

16 Q. And if it comes into effect, is it
17 not likely that it will apply to Ontario Hydro if it
18 applies to anybody?

19 A. Oh, yes, absolutely.

20 Q. And the thing about a Level 2 concern
21 is that it requires you to meet a moving target; is
22 that not correct? In other words, when emission
23 standards in Los Angeles -- somebody discovers a new
24 way to abate SO(2), subject to economics, you are
25 required to meet that new target; that's the idea,

1 isn't it?

2 A. Conditional on the potential
3 difficulties of installing the appropriate equipment.
4 If there were long periods required to install a new
5 technology, then it would be a difficult thing to keep
6 up with, and I think a little bit of discretion would
7 have to be used for large system such as ours which
8 requires several years to install.

9 Q. But, for instance, I understand that
10 with respect to NOx gases, that while the current level
11 might be in the order of 100 parts per million, that in
12 fact if you have to apply the best available
13 technology, you would be down in the order of 7 to 9
14 parts per million. Do you have any information to that
15 extent?

16 MR. DAWSON: A. That would be true of
17 combined-cycle technology, it wouldn't be true of
18 conventional steam cycle technology.

19 Q. And if someone who is proposing to
20 build a NUG has to meet a 7 to 9 parts per million or
21 in that vicinity type of level, that could be extremely
22 expensive; could it not?

23 A. Not necessarily. The combustion
24 turbine manufacturers are indicating that they have
25 some confidence that they will meet a 9 ppm standard in

1 a matter of a few years using dry combusters, with no
2 water injection, but that is speculation at this point.

3 Q. Well, perhaps this is a good time to
4 turn to Interrogatory 8.9.83, which is the first part
5 of 494 and has been separately marked as Exhibit
6 475.28.

7 That interrogatory attached a number of
8 letters sent to the Ministry of the Environment by
9 Ontario Hydro in relation to the Clean Air Program; is
10 that not correct.

11 DR. EFFER: A. I have not looked at the
12 letters, but I believe that two of the letters on this
13 subject were sent to the Ministry of the Environment
14 and one was sent to the Ministry of the Energy.

15 Q. Yes, okay. Attached to this document
16 is an Appendix A. There is a number of Appendix As
17 that are being attached as being the comments and
18 inquiries by Ontario Hydro. I would like you to turn
19 to the one on page 7 of Exhibit 494. It should have a
20 handwritten number at the top of the page.

21 A. Yes, I have that.

22 Q. And under the paragraph numbered 2,
23 CAP, which is Clean Air Program, will accelerate the
24 need for new demand/supply options.

25 Do you see that? Do you see that

1 heading?

2 A. Yes,

3 Q. And it says, paragraph A:

4 The costs of acid gas control
5 equipment retrofits coupled with the
6 uncertainty about future acid gas
7 emission limits under CAP may lead to the
8 premature retirement of some existing
9 fossil stations. This changes the
10 schedule for new supply options.

11 That was the statement of Ontario Hydro
12 to the Ministry of the Environment at that time?

13 A. Yes, that's true.

14 Q. And that remains true?

15 MR. MEEHAN: A. I suppose it's true that
16 it may lead to that.

17 Q. Yes. And the costs associated with
18 meeting the Clean Air Plan and the uncertainty of what
19 those targets will be - as I have said they can be
20 moving targets - has not been allowed for, as I
21 understand it and correct me if I am wrong, in the
22 Update?

23 DR. EFFER: A. To the extent that we are
24 going beyond the requirements of the current acid gas
25 regulation, those steps which we are planning to take

1 will contribute to the more stringent requirements
2 expected under the Clean Air Program.

3 Q. Well, has Ontario Hydro done any
4 study that will take us further than this paragraph 2A,
5 have you studied if the Clean Air Program is applied to
6 Ontario Hydro what is going to be the result, what are
7 the costs going to be, which existing fossil stations
8 will be prematurely retired?

9 A. I don't think the requirements of the
10 Clean Air Program were sufficiently well stated to
11 provide a firm basis for a study at the moment.

12 Q. Well, as I understand it, if SO(2),
13 for instance, falls within Level 2, that it is done and
14 people are doing it now who are thinking of installing
15 NUGs or whatever, going around to and determining what
16 is the best available technology, how much it is going
17 to cost, before they are making any proposals to
18 install a NUG; isn't that going on right now?

19 MR. DAWSON: A. For the category 2 the
20 requirement is best available technology economically
21 available, not best available technology.

22 Q. Exactly.

23 A. And I think we would contend that
24 SO(2) scrubbers are the best available technology
25 economically achievable, so is SCR for NOx, and we are

1 proposing to put that on Lambton and Nanticoke. So to
2 that extent we have already bitten that bullet and
3 decided it is economic to the extent that we put it on
4 Lambton and Nanticoke.

5 Q. I am just concerned about this
6 statement that the application of CAP may lead to
7 premature retirement of some existing fossil stations.
8 Now, I presume that someone with Ontario Hydro did some
9 work before that statement was made to the effect that
10 the application of CAP will result in that.

11 DR. EFFER: A. It may be that some of
12 the other provisions under CAP would place undue
13 expense for controls such as the class 1, some of the
14 class 1 elements, we may not be able to reach those
15 levels, and therefore that might be a basis for
16 withdrawal. But I wouldn't say that the sole condition
17 is related to sulphur dioxide emissions.

18 Q. I wasn't intending. It was the first
19 one that came to mind.

20 All I want to know is whether you have
21 done a study to establish what the costs will be -- or
22 which existing fossil stations will be prematurely
23 retired if and when CAP is applied to Ontario Hydro?

24 A. I don't believe we have done that
25 kind of study.

1 MR. MEEHAN: A. I think we have done
2 sufficient work with respect to Nanticoke and Lambton
3 to know that those two stations wouldn't be prematurely
4 retired, and the updated plan includes the best
5 available technology in those plans for those two
6 stations.

7 If the effects of CAP were to come into
8 play prior to 2006 as an example, they could affect the
9 future for our Lakeview generating station. If they
10 come into effect after 2006, Lakeview is scheduled to
11 retire on that year on an average basis at least. So
12 that it wouldn't affect the early retirement date of
13 our Lakeview generating station.

14 Hearn and Keith, our older stations are
15 mothballed, and it certainly wouldn't be economic to
16 add very much environmental control to those stations.

17 Q. Well, do you know, sir, whether any
18 study has been done either at Lambton or anywhere to
19 see what CAP would do to those stations if they were
20 applied as --

21 A. No, I don't. But I don't think I
22 understand the impact that CAP is ultimately going to
23 have on those stations. By the updated plan we are
24 anticipating and we are anticipating the worst at the
25 moment with respect to those two stations, and we have

1 included environmental control facilities on those two
2 stations that are best available technology and we have
3 the costs for that, and that is included in the Plan,
4 those costs, they are identified in figure C-5, I
5 believe it is, in the updated plan, Exhibit 452.

6 Q. You don't know which stations are
7 being referred to in this statement to the Minister of
8 Energy as being those which may have to be retired?

9 A. I don't know that, no. The statement
10 is quite general.

11 Q. Yes. Would you turn then to page 23.
12 This is another document sent to the Ministry, and it
13 says on page 2 of this document:

14 It should also be recognized that a
15 requirement to make major modifications
16 to a generating plant approaching the end
17 of its useful life could make that plant
18 uneconomic and result in its premature
19 retirement. This will increase pressures
20 to construct new generating capacity
21 earlier.

22 These older plants, as they come to
23 the end of their serviceable life, are
24 operating on progressively lower capacity
25 factors and therefore emissions become of

1 less importance and have little impact on
2 local air quality. Similarly, the added
3 emission control requirements for
4 industrial boilers will likely make a
5 number of cogeneration schemes
6 uneconomic, again adding to Ontario
7 Hydro's need to build new generation
8 earlier.

9 [12:54 p.m.]

10 Now, are those all correct statements,
11 Dr. Effer, or Mr. Shalaby, or Mr. Meehan?

12 A. Yes, they are all true by my way of
13 looking at it.

14 MR. SHALABY: A. But I want to add that
15 I read for the first time as well that the -- on page 6
16 of your exhibit these comments from Ontario Hydro
17 are -- the one at 4 says: Consultation with all
18 stakeholders is essential. And then it goes to the
19 next sentence. It says: The draft Clean Air Program
20 in its present form is very hard to understand and
21 would be costly and complex to implement.

22 So I think the comments being offered
23 here, offered in the context of "this is very hard to
24 understand and complex to implement", and your
25 questions are asking specifics that I think the author

1 of all of these documents is operating in an
2 environment where the CAP program is not fully
3 specified and not fully understood.

4 Q. Well, if he is then I guess I am even
5 more so, and the Board, so I am just dealing with it on
6 that basis.

7 This person, Carole Burnham, is saying
8 that the Clean Air Program will be costly to implement;
9 correct?

10 A. That is what the letter says, yes.

11 Q. I am suggesting to you that on the
12 page we were on, page 23, that it will be costly to NUG
13 generators to meet the Clean Air Program.

14 A. Given its present form. I think they
15 are discussing a draft of the Clean Air Program, and I
16 think the purpose of discussing drafts is to identify
17 issues--

18 Q. Yes.

19 A. --that would lead to, I presume, a
20 program that would balance all these concerns. So I
21 think we are at the stage of identifying issues,
22 identifying what different parts of the program would
23 do to different parts of the energy business. That is
24 what these communication memos are all about, in my
25 judgment.

1 Q. I am suggesting to you that anybody
2 who is contemplating building or financing more
3 particularly a NUG, the first thing he will do is
4 determine the cost of meeting the Clean Air Program as
5 best he can determine it; correct?

6 A. I don't know whether we speak on
7 behalf of NUG developers as well, but it seems like a
8 logical proposition, yes.

9 Q. Well, I am a little bit surprised by
10 that answer because you have in the Update, and indeed
11 the original DSP, a sizable NUG component; right?

12 A. Yes.

13 Q. Right. And Ontario Hydro is planning
14 on NUGs being available to supply power and energy to
15 your system?

16 A. That is right.

17 Q. So you have got to be talking to
18 these people about whether they are going to build
19 them; right?

20 A. Yes.

21 Q. And you are contracting with them?

22 A. Yes.

23 Q. So you have got to know whether they
24 can and will meet these projected environmental
25 standards, don't you?

1 A. They can and will meet current
2 standards. I don't know to what extent the discussions
3 are taking place about future standards. I don't know
4 that.

5 Q. You don't know that?

6 A. I don't know that.

7 Q. I am suggesting to you that everybody
8 who is contemplating installing a NUG is now examining
9 what the current best technology in the world is
10 because they know that in a new installation they are
11 going to be required to meet the Clean Air Program if
12 it comes in.

13 A. I am saying it sounds logical. I am
14 just saying as well that I don't know that as a
15 firsthand fact.

16 Q. I am suggesting to you that, as it
17 says on page 23, the Clean Air Program will likely make
18 a number of these schemes uneconomic.

19 A. Yes.

20 Q. Now, has Ontario Hydro taken that
21 into consideration in determining the amount of NUG
22 capacity that will be available, and how?

23 MS. KARISH: I think Panel 5 discussed
24 what they took into consideration when determining what
25 NUG capacity they felt would be available.

1 MR. HEINTZMAN: Well, this panel has been
2 talking about NUGs as part of fossil generation, and we
3 have a new Update. It would seem to me that --

4 THE CHAIRMAN: Well, it seems to me again
5 that this is a planning question, is it not? I take it
6 that nobody here can say whether they have taken that
7 particular issue into consideration in their planning.

8 MR. SHALABY: I am not aware to what
9 extent it was taken into consideration or not. Anybody
10 else?

11 THE CHAIRMAN: So until we hear
12 differently we can assume it was not taken into
13 consideration.

14 MR. HEINTZMAN: Well, I think unless we
15 hear to the contrary I would say the witness said that
16 he would assume that they would take it into
17 consideration.

18 THE CHAIRMAN: All right.

19 MR. HEINTZMAN: And certainly on the
20 upper part of page 23 --

21 THE CHAIRMAN: But just to round it out,
22 this is not a matter that Hydro checks or investigates.
23 They rely on the NUGs to do what they want to do, and
24 they don't worry about compliance with regulations.
25 That is the NUG's problem, as I understand it.

1 MR. HEINTZMAN: If that is what some
2 witnesses said, Mr. Chairman, I will --

3 THE CHAIRMAN: Well, that is what they
4 said.

5 MR. HEINTZMAN: I find that surprising.

6 THE CHAIRMAN: Now, you may not agree
7 with that, you may not think that is a prudent thing to
8 do. But that is what they said.

9 MR. HEINTZMAN: Q. Certainly, the part
10 at the top of page 23 is correct, is it not, that to
11 the extent that the CAP program requires major
12 modifications to a generating plant approaching the end
13 of its useful life could make that plant uneconomic?

14 MR. MEEHAN: A. That is true, but it is
15 also true that by extending the life of that plant it
16 can make adding those facilities economic. So it goes
17 hand in hand with the life extension idea and the life
18 management idea.

19 Q. But it is sort of a chicken and egg
20 proposition, isn't it?

21 A. It can be thought of that way, yes.

22 Q. Yes. And whichever is the chicken or
23 the egg, one of them dies because of premature
24 retirement. That is what this sentence is saying at
25 the top of page 23?

1 A. I am not just sure when this document
2 was written. 1988? Well, certainly our philosophy has
3 changed considerably since then.

4 Q. But if CAP does result in making
5 plants that are uneconomic it is obvious that there is
6 going to be premature retirement?

7 A. It is precisely the anticipation of
8 things like CAP that have us planning to install the
9 best available technology on Nanticoke and Lambton and
10 extending their lives.

11 MR. HEINTZMAN: Perhaps that is a good
12 time to take the luncheon break, Mr. Chairman.

13 THE CHAIRMAN: We are adjourned until
14 2:30.

15 THE REGISTRAR: This hearing will adjourn
16 until 2:30.

17 ---Lunch recess at 1:00 p.m.

18 ---On resuming at 2:33 p.m.

19 THE REGISTRAR: Please come to order.
20 This hearing is again in session. Please be seated.

21 THE CHAIRMAN: Before Mr. Heintzman
22 starts, I understand Dr. Effer has a comment he wishes
23 to make?

24 DR. EFFER: This morning I think we had a
25 little uncertainty attached to how the air toxics were

1 categorized under the Clean Air Program, and I have
2 tried to seek clarification on this. I hope that what
3 I have to say does clarify it. I am not quite sure
4 that it does.

5 But the Phase 1 chemicals which you drew
6 attention to, do not necessarily all have Level 1
7 concerns.

8 All except manganese do. Manganese is
9 still under discussion as to whether it fits Level 1 or
10 Level 2.

11 The Appendix 6.4 referred to in the
12 paragraph over the table contains around 200 chemicals
13 which have been provisionally put in one of four
14 categories, and they will be moved in in time as
15 described into the various levels of concern when the
16 necessary investigations of them have been completed.
17 ---Off the record.

18 THE CHAIRMAN: Just so that it is clear
19 on the record, what you are referring to is page 6 of
20 Exhibit 496. That is page 6 of 496?

21 DR. EFFER: That is correct.

22 MR. HEINTZMAN: Q. I just have one last
23 area of inquiry before I pass things on to Ms. Findlay,
24 and I have given to the Registrar and if he could hand
25 it to the Board and to members of the Panel a

1 calculation which has been made for me of the CO(2)
2 emissions avoided if Hydro forgoes the life extension
3 of Lambton and Nanticoke.

4 Dr. Effer, since I have just had this
5 document prepared I am quite happy just to have it
6 marked and leave it with you to have you confirm that
7 the numbers in the calculations are correct because I
8 just got it myself.

9 If that is satisfactory with the Board, I
10 would ask that that be done.

11 THE REGISTRAR: That will be 497, Mr.
12 Chairman.

13 ---EXHIBIT NO. 497: Calculation by Mr. Heintzman of
14 the CO(2) emission avoided if
15 Hydro forgoes the life extension
of Lambton and Nanticoke.

16 MR. HOWARD: I assume, Mr. Chairman -- we
17 will undertake to check the arithmetic, but I assume in
18 due course my friend will introduce the exhibit or
19 whoever made it subject to cross-examination at that
20 time. I have no objection to that procedure.

21 MR. HEINTZMAN: Well, I wasn't intending
22 to call anybody to prove the document. I was intending
23 to prove it through Dr. Effer.

24 The column on the left-hand side follows
25 the retirement dates otherwise scheduled, and then the

1 cumulative totals, the energy derived, and the
2 emissions avoided are all taken from the original DSP
3 or information otherwise readily available, and a
4 factor of capacity use of .20 for Lambton and Nanticoke
5 was used which is below the 29 per cent which we heard
6 this morning.

7 Q. Otherwise, I think that all of the
8 information there is within the Province of Ontario
9 Hydro, and I would assume that you could verify or
10 otherwise comment upon these numbers, Dr. Effer. Is
11 that possible?

12 DR. EFFER: A. Yes, we will -- oh.

13 MR. HOWARD: Well, with great respect,

14 Mr. Chairman, my friend says it is all
15 derived from the DSP, and I see note 3 is an assumption
16 which somebody has made, but it doesn't appear to be --
17 maybe from an environmental analysis, but I suppose if
18 he is not going to call any witness to deal with it I
19 will deal with it in due course.

20 MR. HEINTZMAN: Do I have an undertaking,
21 then, as best as Ontario Hydro can to verify the
22 numbers in that document?

23 MR. HOWARD: No, you don't have such an
24 undertaking as far as I am concerned.

25 THE CHAIRMAN: Mr. Howard's position,

1 because this has come up before, is that the
2 arithmetic is arithmetic and if that is all that Hydro
3 is being asked to do that the parties can do that as
4 well as Hydro can, and that is it.

5 MR. HEINTZMAN: So far as the
6 non-arithmetic numbers, that is --

7 THE CHAIRMAN: I guess what you really
8 would -- perhaps you might ask about some of the
9 assumptions you have made and see what he says about
10 them.

11 MR. HEINTZMAN: All right.

12 Q. Looking down, Megawatts Retired, Dr.
13 Effer or Mr. Shalaby, do you have any problems with the
14 numbers that we have taken from Exhibit 3 as being the
15 retirements which would otherwise have occurred?

16 THE CHAIRMAN: Well, I wouldn't have
17 thought those were problems. I would think those are
18 pretty self-evident. I haven't read this thing so I
19 may not be giving it the -- but the assumption you make
20 in number 3, for example, may be controversial. I
21 don't know.

22 MR. HEINTZMAN: Yes. All right.

23 Q. The capacity factor is just a number
24 that is taken, so I will take that as read.

25 Insofar as the CO(2) emissions avoided,

1 do you have any problem with the assumption there or
2 can you verify it in due course?

3 DR. EFFER: A. It is not clear whether
4 that is one of your assumptions or one of the
5 assumptions of the environmental analysis, and this we
6 will check on.

7 Q. And if you have any information that
8 differs from the assumption or information under number
9 3 you will let us know?

10 MR. HOWARD: Well, I have tried to make
11 myself clear. My friend has produced this document.
12 It doesn't yet have an exhibit number.

13 THE CHAIRMAN: Yes, it does.

14 MR. HEINTZMAN: 497.

15 MR. HOWARD: Well, Exhibit 497.

16 MR. HEINTZMAN: You have to be faster.

17 MR. HOWARD: And if he wants to go away
18 after today and not be here when we tell him how lousy
19 it is, then that is fine. But we do not undertake to
20 accept this, period.

21 MR. HEINTZMAN: Well, what is my friend's
22 problem? I am here to try to get out on the table the
23 information that is relevant with respect to CO(2)
24 emissions. It is a major part of the DSP, and if Dr.
25 Effer and the panel can tell us whether the assumption

1 of .95 kilograms of CO(2) per kilowatthour is a proper
2 assumption based upon the environmental analysis in
3 Exhibit 4 or otherwise, I am happy. I don't want to
4 prolong the hearing, but I think I am entitled to that
5 answer.

6 THE CHAIRMAN: I think you are entitled
7 to an answer whether that is a proper figure or if it
8 is not what the proper figure is. And they want to
9 check it, and maybe that can be the subject matter of
10 an undertaking?

11 DR. EFFER: .95 is the figure, yes, that
12 is being used in the environmental analysis.

13 MR. HEINTZMAN: Q. And therefore,
14 subject to the mathematics being correct, Dr. Effer, do
15 you see anything in the document which you take issue
16 with with respect to the basis of the calculations?

17 MR. HOWARD: Mr. Chairman, this document
18 was supplied over the lunch hour. This document is not
19 simple. If my friend wants a critique of this document
20 as an undertaking I will give that undertaking and in
21 due course we will give him a critique of it.

22 THE CHAIRMAN: That is what he suggested
23 at the very beginning. So we will put that down as an
24 undertaking.

25 THE REGISTRAR: 478.22.

1 MR. HOWARD: Critique of Exhibit 497.

2 THE CHAIRMAN: Yes.

3 MR. HEINTZMAN: Thank you. I will turn
4 matters over to Ms. Findlay.

5 MR. HOWARD: Too bad I wasn't here
6 earlier if that has been going on.

7 ---UNDERTAKING NO. 478.22: Ontario Hydro undertakes to
8 provide a critique of Exhibit 497.

9 CROSS-EXAMINATION BY MS. FINDLAY:

10 Q. You will be happy to know, Panel,
11 that I am not going to try and ask you to make any
12 comparisons in alternatives and I am not going to ask
13 you to prove any documents that you haven't seen
14 before.

15 I would like to start, if I could, with I
16 think you, Mr. Meehan, and if we could turn to
17 Interrogatory 8.4.15.

18 And we will need a number for that,
19 please?

20 THE REGISTRAR: Should this not be
21 8.42.15?

22 MS. FINDLAY: Yes, sorry.

23 THE REGISTRAR: Thank you. That will be
24 475.29.

25 ---EXHIBIT NO. 475.29: Interrogatory No. 8.42.15.

1 MS. FINDLAY: Q. And if we turn to the
2 last page, which is a chart, at least it is the last
3 page that I have short of the report that was
4 submitted, the chart is entitled, Cost Summary for
5 Recommended Plan.

6 MR. MEEHAN: A. I'm sorry, where do I
7 find the interrogatory?

8 Q. It is 8.42.15. It is a separate
9 page. It is not in the initial package that was
10 submitted.

11 A. All right. I have it.

12 Q. Now, on the chart in column 2 we have
13 indicated in-service dates for Lambton, that being 1994
14 and 1997, and that is for the FGD equipment?

15 A. That is correct.

16 Q. And likewise under Nanticoke, we have
17 in-service dates for FGD equipment, and the numbers
18 there, the dates indicated are 1999, and I take it it
19 is 2001, 2003 and 2005; is that correct?

20 A. That is correct. I believe that in
21 the study which supports the updated plan, the
22 assumptions are that two scrubbers would be installed
23 in each one of those years.

24 Q. I take it, then, since we have set
25 dates set in the chart that these are commitments of

1 Ontario Hydro to install?

2 A. They are plans. The only scrubbers
3 that are committed are the first two scrubbers at
4 Lambton that are shown to have a 1994 date.

5 Q. So the dates that you have shown on
6 this chart could change as far as Nanticoke is
7 concerned?

8 A. Yes, they could change.

9 [2:45 p.m.]

10 THE CHAIRMAN: It's only the 1994
11 in-service scrubbers that are committed as opposed to
12 being planned; is that right?

13 MR. MEEHAN: That's correct.

14 THE CHAIRMAN: So there is two more due
15 for Lambton in '97 under the planning but no
16 commitment.

17 MR. MEEHAN: No commitment has been made
18 for those. To meet that date we would have to commit
19 them by about this time next year.

20 MS. FINDLAY: Q. Would you agree with
21 me, Mr. Meehan, that Hydro started considering
22 insulation of FGD equipment or scrubber equipment
23 shortly after Regulation 281/87 was proclaimed in
24 force? That being the acid gas.

25 MR. MEEHAN: A. Do you recall when that

1 might have been?

2 Q. 1987.

3 A. In '87. We were planning scrubbers I
4 think before that time, yes.

5 Q. And commitments would only have been
6 made after the acid gas control, the acid rain
7 regulation to which Ontario Hydro is subject?

8 A. The commitment for the first pair at
9 Lambton was made in October of 1989.

10 Q. All right. And since that time would
11 you agree with me that Ontario Hydro has proposed a
12 number of different dates for installation of scrubbers
13 on Nanticoke in particular?

14 A. The timing of the planned scrubbers
15 at Lambton and Nanticoke have varied over time
16 depending on the requirement for them, yes.

17 Q. In fact, it's varied at one time in
18 Ontario Hydro's planning from 1996, another proposal
19 was 1998, another was that all might go in 1989, and
20 now we have a proposal, not a commitment as I
21 understand you, that units will be phased in starting
22 in 1999?

23 A. That's all fair to say. I don't
24 recall us ever saying that we could undertake putting
25 eight of them into Nanticoke in one year. I don't

1 think that would be physically possible.

2 Q. But it would be fair to say that the
3 in-service dates are still somewhat uncertain?

4 A. Yes, that's fair enough.

5 Q. Now, just on the science that's
6 associated with scrubbers, and in particular the
7 by-product, which I understand can be referred to as
8 chemical gypsum, do you have a familiarity with the
9 properties of chemical gypsum or the way it might be
10 compared to natural gypsum?

11 A. I think Mr. Dawson would help us with
12 that perhaps.

13 Q. I don't really need a detailed
14 comparison. I just need your confirmation that
15 chemical gypsum can be used in place of natural gypsum.

16 MR. DAWSON: A. That's correct, yes.

17 Q. And that natural gypsum is a material
18 that's actually mined from underground mines?

19 A. That's right. It's mined in the
20 Caledonia area in Ontario.

21 Q. The chemical gypsum can be used in
22 place of natural gypsum particularly in the wallboard
23 industry; is that correct?

24 A. That's correct.

25 Q. Ontario Hydro's EA document, or the

1 environmental assessment document for the FGD scrubbers
2 requires that Ontario Hydro use equipment that will
3 produce wallboard grade gypsum is; is that correct?

4 A. That's correct.

5 Q. Are you aware that the main market
6 for gypsum in Ontario falls primarily to three
7 wallboard companies?

8 A. I am, yes.

9 Q. And of the three wallboard companies,
10 one has already committed to take the output of
11 Lambton?

12 A. That's correct.

13 Q. And gypsum, chemical gypsum as
14 opposed to natural gypsum is very attractive to the
15 wallboard companies because it's cheaper to use rather
16 than maintaining the costs of a mine; is that correct?

17 A. I wouldn't want to go very far in
18 speaking to the relative economics of FGD gypsum
19 relative to mine gypsum, that's something that the
20 wallboard companies know a lot more about than I do.
21 But apparently we have certainly had interest in the
22 idea of them taking FGD gypsum.

23 Q. Isn't that one of the reasons that
24 Ontario Hydro has confidence that they will be able to
25 get rid of their gypsum waste?

1 A. Yes, we think there is some potential
2 there.

3 Q. Are you aware that it has become
4 quite a competitive market amongst the wallboard
5 companies to obtain gypsum from utilities?

6 A. Yes.

7 Q. Do you have any information on the
8 ability of the wallboard company who has obtained the
9 contract for Lambton to actually process all of the
10 material that will be produced from Lambton?

11 A. Not directly, other than I know or I
12 have been told that, in fact, they have a concern that
13 we may only build two scrubbers and not four. So their
14 preference is for the full output of Lambton to be --
15 they would prefer to see and take the full 2,000
16 megawatt production of gypsum from Lambton rather than
17 1,000 megawatt.

18 Q. Do you know if they currently have
19 the facilities to deal with that amount of waste, or
20 amount of gypsum?

21 A. I think in fact we are talking about
22 a new facility altogether as far as Lambton is
23 concerned.

24 Q. So they would have to build a new
25 facility in order to deal with it?

1 A. So I think it's the economy of scale
2 that's at issue.

3 Q. And the contract that that company
4 has, has it contemplated the additional 10 years life
5 extension from Lambton--

6 A. I have no idea.

7 Q. --of waste that will be produced?

8 A. I have no idea. All I can think
9 though is that that will help in terms of commercial
10 feasibility of using FGD waste gypsum.

11 Q. In the new facility that's going to
12 be built?

13 A. Yes.

14 Q. Now, the panel has indicated that it
15 has consulted with U.S. utilities on other matters in
16 particular having to do with the life extension. I
17 wonder if you know whether the U.S. utilities are now
18 preparing for the Clean Air Program down in the States?

19 A. Yes, I do.

20 Q. The Clean Air Program, as I
21 understand it, will be implemented in two phases, 1995
22 being the first limit and the year 2000 being the
23 second?

24 A. Yes.

25 Q. Are you also aware that the U.S.

1 companies are now signing engineering contracts for
2 equipment to be installed in order to meet the CAP,
3 they call it CAP as well, the CAP limits?

4 A. Yes.

5 Q. Are you also aware that the U.S.
6 utilities, particularly in the Ohio Valley, are looking
7 about for purchasers of their gypsum waste and looking
8 for purchasers to enter into long-term, 20 year
9 contracts?

10 A. I can imagine that that's true. I
11 don't personally know that that's true, but I can well
12 imagine that utilities are looking for people to take
13 wallboard quality gypsum, yes, as an alternative to
14 landfill.

15 Q. And that such contracts will be, in
16 any event, entered into before the year 2000 given that
17 that will be the outside limit for the U.S. utilities
18 to meet the CAP limits?

19 A. Yes.

20 Q. Are you aware that the gypsum
21 industry in Ontario has great concerns because of the
22 uncertainty surrounding Nanticoke that a gypsum market
23 will not be available to them in time?

24 A. I'm not particularly aware of that
25 concern, no.

1 Q. Are you aware that the gypsum
2 industry in Ontario is considering entering into
3 long-term contracts with U.S. utilities because of the
4 uncertainty surrounding the in-service dates with
5 Nanticoke?

6 A. No, I wasn't, no.

7 Q. In any event that the gypsum
8 companies were, and remind you that there are now only
9 two viable wallboard companies who might be able to
10 take the output since one has already taken the output
11 from Lambton, in the event that the two companies enter
12 into long-term contracts with the U.S. utilities,
13 wouldn't that very seriously limit Ontario Hydro's
14 ability to sell its gypsum?

15 A. It may do, yes.

16 Q. One of the difficulties in finding a
17 market for the gypsum is because of the properties of
18 gypsum; is that correct? I think this would be more a
19 question for Mr. Dawson.

20 A. In what sense does that make it
21 difficult to --

22 Q. Mr. Dawson, I think you indicated --

23 THE CHAIRMAN: You are talking to Mr.
24 Dawson.

25 MS. FINDLAY: Sorry.

1 Q. Mr. Dawson, I think you indicated
2 that the properties of gypsum are such that you don't
3 want to transport it very far.

4 MR. DAWSON: A. In the sense that it is
5 not a high value product and therefore it's not
6 economic to transport it very far and that would tend
7 me to make me a little skeptical about the idea that
8 U.S. utilities are going to sell gypsum to the Ontario
9 wallboard industry.

10 Q. Isn't it also because gypsum is
11 between 8 and 10 per cent moisture and that when it's
12 produced, particularly in the winter, it will freeze?

13 A. Well, the fact that it has got 8 to
14 10 per cent moisture tends to make it less economical
15 to transport because you are transporting water.

16 Coal also contains moisture but it
17 doesn't -- but we transport it in winter by train, and
18 yes, it does freeze on the surface. You put it in a
19 thaw shed when you want to unload it.

20 Q. This time I will look at the person
21 that I am addressing. This time I do mean Mr. Meehan.

22 In evidence, Mr. Meehan, I think that you
23 said that Lambton and Nanticoke, at least for planning
24 purposes, are going to be extended for a period of 10
25 years; is that correct?

1 MR. MEEHAN: A. Or more.

2 Q. Ten years or more.

3 If we use the assumption of 10 years,
4 would I be correct in the assumption that Nanticoke
5 would retire in the year 2023?

6 A. On average I believe that's correct.

7 Q. And likewise Lambton on the
8 assumption that it is retired after, for planning
9 purposes, a period 10 years, would it retire in 2019?

10 A. Begin to retire then, yes. 2019 or
11 2020.

12 Q. I wonder if you could turn with me to
13 Exhibit 494, and it is page 24. In the middle of the
14 paragraph --

15 THE CHAIRMAN: Just a moment, I haven't
16 found it yet.

17 MS. FINDLAY: Sorry.

18 THE CHAIRMAN: Go ahead.

19 MS. FINDLAY: Q. In the middle of the
20 paragraph there is a sentence that reads: These costs
21 are lifecycle cost assuming a 16-year operating life.

22 MR. MEEHAN: A. Which paragraph should I
23 be looking at?

24 Q. I'm sorry, it's the first paragraph.
25 Feel free to flip back to page 23 which is the balance

1 of the paragraph.

2 I wonder if you could confirm for me that
3 what is being referred to there is an assumption by
4 Ontario Hydro that certain pollution control equipment
5 is assumed to have a 16-year life?

6 A. No, the 16 years I would think
7 referred to the end of life at Lambton, if that's the
8 station we are talking about, which would have been, at
9 that time, the end of its 40-year life. It's not the
10 life of the equipment we are talking about but the life
11 assumed for the generating station.

12 Q. Is there anything in any of the
13 documentation that indicates how long Ontario Hydro
14 assumes its pollution control equipment will be
15 operative?

16 A. We would expect that we could life
17 manage the operation of that equipment the same as we
18 can the generating station. So parts would be replaced
19 from time to time, but we would continue to make it
20 operate through the life extended period of the plant.

21 Q. If the scrubbers for both Lambton and
22 Nanticoke are installed as recommended, is there
23 anything that indicates where Ontario Hydro has
24 assessed the costs of replacement or repair of that
25 scrubber equipment?

1 MR. DAWSON: A. Yes, we have a cost
2 component called capital modifications which, with the
3 OM&A costs, covers off the repair and replacement of
4 capital items as necessary; for instance, rubber
5 linings inside the absorber vessel and replacement of
6 corroded duct work, that type of thing.

7 Q. Would it include costs of entire
8 replacement of a scrubber unit which I understand is in
9 the range of \$537 million for a pair?

10 A. No, it doesn't include the entire
11 replacement of a scrubber unit. We don't think that
12 will be necessary.

13 For the new equipment that we have
14 estimated we don't double the cost of the scrubber, we
15 put in the scrubber once and then we have capital
16 modification of cost to account for the maintenance and
17 repair of that scrubber as necessary.

18 Q. Hydro hasn't yet had any experience
19 with scrubber equipment; is that right?

20 A. No, but we have talked with a lot of
21 utilities that have.

22 Q. Have any of the other utilities to
23 whom you have spoken had retirements of their scrubber
24 equipment?

25 A. Retirements of their scrubber

1 equipment?

2 Q. Yes, have they had the opportunity to
3 see what a life service of scrubber equipment would be?

4 A. No. But they have had long enough
5 experience to know that it isn't falling apart, or that
6 the more recent designs are certainly not falling
7 apart.

8 I agree, the very early designs had a lot
9 of scaling problems and a lot of corrosion problems.
10 Those problems have been solved.

11 Q. But your costing has to be based on
12 estimates only?

13 A. Yes.

14 Q. I would like to turn now to the issue
15 of flyash. I guess, Dr. Effer, that would be your area
16 of expertise, would it?

17 DR. EFFER: A. It may be.

18 Q. I will give it a shot.

19 It's my understanding that flyash is a
20 waste that's listed on Regulation 309; is that correct?

21 A. Yes.

22 Q. And, in fact, Ontario Hydro operates
23 its waste disposal sites on-site, including its flyash
24 disposal sites, under a Certificate of Approval issued
25 by the Ministry of the Environment?

1 A. That's correct, yes.

2 Q. I think this has probably been given
3 in evidence before, but I wonder if you could remind me
4 how much flyash is produced per year? Is it over a
5 million tonnes?

6 A. A little under a million tonnes a
7 year.

8 Q. Would it be acceptable to use a
9 million tonnes just as round number?

10 A. Yes.

11 Q. Of that amount, how much in tonnage
12 is landfilled per year, approximately?

13 MR. DAWSON: A. Could you repeat the
14 question again?

15 Q. Of the million tonnes, how much of
16 that is landfilled per year?

17 A. All of it other than Lakeview
18 production which amounts to -- all but about 12 per
19 cent. So that's 88 per cent of it.

20 Q. And how much in tonnage is used by
21 the cement industry?

22 A. How much is used by the cement
23 industry?

24 Q. Yes.

25 A. About a 120 tonnes, which equates to

1 12 per cent.

2 Q. So 120,000 tonnes of a million tonnes
3 are used in the cement industry?

4 A. I'm sorry?

5 Q. 120,000 tonnes of a million tonnes
6 are used by --

7 A. Approximately, yes. Basically it
8 depends on the extent to which Lakeview operates,
9 because it is Lakeview ash which goes to the cement
10 industry.

11 Q. That's right. The more it's operated
12 the more flyash there will be.

13 A. Right.

14 MR. MEEHAN: A. Sometimes it's more or
15 less than the 120,000 tonnes. It could be as low as
16 60,000 tonnes or as high of 150,000 tonnes, I believe.

17 Q. All right. Hydro doesn't make money
18 on its flyash that is sent to this cement industry,
19 does it?

20 MR. BURPEE: A. Yes, there is a credit,
21 for ash used in cement there is a credit.

22 In the case of Lakeview ash, though, we
23 are paying the transportation costs using it to
24 either -- I'm can't remember if it's Woodstock or
25 Ingersoll and Bath, which is downs towards Kingston.

1 So there is a transportation cost offset by a credit
2 for that use in cement production.

3 From Thunder Bay we also sell a fair
4 amount of that ash that goes to, I believe, it's Kidd
5 Creek Mines in Timmins who use it for mine backfill,
6 backfilling stopes and whatnot in place of Portland
7 cement.

8 Q. When you say it's a credit, what is a
9 credit?

10 A. Well, they probably give us in the
11 order of - I can't remember - say \$5 tonne for it, for
12 example. It might cost us \$15 a tonne to get it but
13 then they pay us \$5 a tonne for a net cost.

14 Q. So, it's actually a cost to Ontario
15 Hydro?

16 A. From Lakeview it is a cost, from
17 Thunder Bay we make money on it.

18 MR. DAWSON: A. It may be a reduced cost
19 relative to disposal of ash in a landfill somewhere
20 else.

21 Q. Now, in Exhibit 468, if you can turn
22 to page 73.

23 DR. EFFER: A. Yes, we have it.

24 Q. In the middle of the page Ontario
25 Hydro refers to the use of flyash in a 16 hectare shale

1 quarry in Mississauga. I put it to you that that's
2 actually a waste management method. That's really a
3 form of landfilling; is it not?

4 MR. DAWSON: A. It could be called
5 landfilling or land reclamation, too. It depends on
6 your perspective, I guess.

7 Q. But the operators of quarry would
8 have to have a Certificate of Approval in order to
9 receive that have waste, would they not?

10 MR. BURPEE: A. They did for that
11 quarry. To us it was landfilling, for the people who
12 took care of the ash they had some end-use in mind and
13 it had to meet certain criteria, so it could have, I
14 believe, some industrial use afterwards.

15 MR. DAWSON: A. Quarry owners do have to
16 file reclamation plans, I believe, for the quarries,
17 and that's one way of reclaiming and rehabilitating the
18 quarry at the end of its use.

19 [3:05 p.m.]

20 Q. So is Hydro putting forward flyash
21 filling of quarries as a positive land use?

22 A. We think it has some advantages from
23 that point of view, yes, providing you can meet all the
24 other environmental criteria.

25 Q. Is Hydro aware of concerns that have

1 been raised about landfilling in quarries, such as the
2 instability of the quarry floors?

3 A. Very.

4 Q. How have you reconciled those
5 concerns, notwithstanding you have sent a certain
6 amount of flyash to a shale quarry?

7 A. We are currently looking at
8 alternatives to doing that, and, in fact, we are trying
9 to manage our ash waste on our own existing property.
10 That is the current plan.

11 Q. Has Hydro any other landfill sites to
12 which they have sent the flyash in Ontario, apart from
13 Hydro's own sites?

14 A. Yes. It went to a place called
15 Birchwood Park in Mississauga, too, is one that I am
16 aware of, and there are others that I know.

17 MR. BURPEE: A. All the Lakeview ash has
18 been disposed of off site, so over the operation of the
19 plant since 1961, it has essentially all been off site,
20 and they have filled a number of quarries in the local
21 area. And the Birchwood Park that Mr. Dawson refers to
22 at one time was called Flyash Park.

23 Q. I wonder if you could elaborate, Mr.
24 Dawson, when you said that you are very aware of the
25 concerns about landfilling in quarries?

1 MR. DAWSON: A. One of my

2 responsibilities has recently been to try and find an
3 alternative disposal site for Lakeview ash as a backup
4 to the cement use as a contingency, in the event that
5 we would not be able to send it to a cement plant, and
6 that has proved to be a rather difficult task because
7 of public concerns and public opposition.

8 Q. Other than public concerns are you
9 aware of studies that have been done on the integrity
10 of quarry floors and the principle known as "quarry
11 floor pop-ups"?

12 A. Quarry floor--

13 Q. Pop-ups?

14 A. --pop-ups? No. We have done a lot
15 of work looking at the integrity of several specific
16 quarries, though, from the point of view of ash
17 disposal.

18 Q. Well, as a recommendation I would
19 suggest you look into that a little further because it
20 is certainly an issue that is --

21 A. Well, we haven't gone into it blindly
22 and we have used some very reputable geologists to look
23 at the problem.

24 DR. CONNELL: That is not an edible
25 product, I take it? [Laughter]

1 MS. FINDLAY: No.

2 MR. BURPEE: With reference to the flyash
3 sales, we answered an interrogatory that quoted some
4 numbers. It is 8.14.5, and we quoted the money that we
5 made off flyash sales in 1989 and 1990.

6 THE CHAIRMAN: Could we have a number for
7 that interrogatory, please, 8.14.5?

8 THE REGISTRAR: That will be .30.

9 THE CHAIRMAN: Thank you.

10 ---EXHIBIT NO. 475.30: Interrogatory No. 8.14.5.

11 MS. FINDLAY: Q. But as you have said,
12 Mr. Burpee, it is in fact not a money making venture
13 that Ontario Hydro is out to try and market, for
14 example. It is a net cost in most circumstances, and
15 it is a waste disposal problem?

16 MR. BURPEE: A. It is a waste disposal
17 problem.

18 MR. DAWSON: A. I will just repeat that
19 it could be a net saving over the option of disposal,
20 and that is the way we are looking at it right now.

21 Q. Yes. In making planning assumptions
22 for the extension of both Lambton and Nanticoke for a
23 period of ten years or more has Ontario Hydro also
24 assumed that there will be ten years' more flyash
25 produced than would normally have been the case?

1 MR. MEEHAN: A. That would be the case.

2 Q. At one million tons per year that is
3 ten million additional tons of flyash that Ontario
4 Hydro is going to have to dispose of?

5 A. Well, I don't think it is quite that
6 simple.

7 I think I have already suggested that the
8 total fossil production in the updated plan is likely
9 less than it was in the 1989 plan because of the demand
10 management and the non-utility generation we are
11 assuming. So in that event, I can't judge whether
12 there is -- I don't think there is an awful lot more
13 total ash in the planning period than there was before.

14 Q. Won't it be ten additional years'
15 from Lambton and Nanticoke, though. If they were to
16 have been retired at a given date and they are now
17 going to be extended for ten years, from those plants
18 there will be ten additional years'; is that not
19 correct?

20 A. Yes, but if they weren't retired we
21 might have replaced them with some form of fossil
22 generation, some coal-fired generation, which would
23 have given us the same problem.

24 Q. But you might not have replaced it by
25 a fossil fuel-fired generation.

1 A. We may or may not have, that's true.
2 But it is pretty far in the future.

3 One thing that hasn't been said here with
4 respect to ash is that Ontario Hydro is initiating work
5 that will hopefully find utilization for ash other than
6 cement and that we will be able to utilize more ash
7 than we have been in the past. So there is
8 considerable effort going into that in a preliminary
9 way right now.

10 Q. In conjunction with that, has anyone
11 from Ontario Hydro taken a look at Bill 143, which is
12 the Waste Management Act for Ontario?

13 A. I am not aware of that Act.

14 Q. So you haven't reviewed it to see
15 what the Ministry of the Environment might be proposing
16 as far as designations of flyash?

17 A. I believe we are discussing what it
18 is we are wanting to do with the Ministry of
19 Environment.

20 Q. Have you made comments to the
21 Ministry of the Environment on Bill 143?

22 A. I don't know that.

23 MR. DAWSON: A. We are currently
24 finalizing an issue paper on the whole issue of ash
25 management, which is intended to go to the Ministry of

1 the Environment on that issue.

2 Q. Is that something that you would
3 provide to us once it is available?

4 A. I couldn't undertake to do that right
5 now. It is currently a draft, and I don't know exactly
6 what standing it has got at the moment within Ontario
7 Hydro.

8 Q. At the point when it has been
9 submitted to the Ministry of the Environment would that
10 be an appropriate time?

11 A. I would think it might be.

12 Q. May I have that undertaking?

13 MR. HOWARD: Well, Mr. Chairman, I don't
14 know when that is going to take place, but if, as and
15 when we deliver a document to the government the
16 government can no doubt deal with it.

17 But if my friend wants it made part of
18 the record, assuming it is relevant, we will produce it
19 whenever it is finalized.

20 THE CHAIRMAN: Assuming it is not
21 confidential.

22 MR. HOWARD: Assuming it is not
23 confidential.

24 THE CHAIRMAN: So that will be 478?

25 THE REGISTRAR: .23.

1 ---UNDERTAKING NO. 478.23: Ontario Hydro undertakes to
2 produce its issue paper on the issue
 of ash management, intended for the
 Ministry of the Environment.

4 MS. FINDLAY: Q. Mr. Dawson, are you
5 aware that under Bill 143 the Ministry of the
6 Environment is going to have new powers to designate
7 wastes under different categories? In other words, it
8 may have the ability to redesignate wastes that are not
9 currently considered hazardous or registerable?

10 MR. DAWSON: A. I am not aware of Bill
11 143 precisely.

12 Q. Has anyone at Hydro done any kind of
13 costing to assess its ability to market ash after Bill
14 143 comes into force?

15 MR. BURPEE: A. Within parts of the
16 corporation we are looking at ash management
17 strategies, and that is part of what Mr. Dawson said
18 before. It is all tied in with that.

19 , I don't have any specific knowledge of
20 how it has been looked at or what has been done, but I
21 know that there is work on-going right now.

22 Q. Wouldn't one of the relevant factors
23 be that if flyash is designated as a hazardous or
24 registerable waste that Ontario Hydro would no longer
25 be able to sell it "to the cement industry"?

1 MR. DAWSON: A. I think you have to be a
2 little careful there because some of the things that
3 you may do with flyash would modify its characteristics
4 so that it may well then not be a registerable waste.

5 Q. That is under the current scheme.

6 A. It may well be in the future one, I
7 don't know.

8 Q. But it also may not be?

9 A. If you modify the characteristics so
10 that it meets a different criteria, then it falls into
11 a different criteria.

12 Q. But in the event that it is
13 designated as a registerable or hazardous waste under
14 the new Bill 143 would that not prevent Ontario Hydro
15 from selling it to --

16 A. Not if we modify the characteristics
17 so that it then falls outside that categorization.
18 That is what I am trying to point out to you.

19 Q. Can you then tell me what the
20 properties of flyash are that you would be modifying so
21 that it didn't fit within such a regulation?

22 A. Its leaching characteristics. For
23 instance, if you treated it to produce a light-weight
24 aggregate you essentially change its leaching
25 characteristics and reduce the amount of leaching that

1 occurs as a result of...

2 Q. Is it a dilution of the materials
3 that are contained within flyash?

4 A. I'm sorry?

5 Q. Is it a dilution of the materials
6 that are contained within flyash?

7 A. No, it is the fact that you in fact
8 melt it and convert it into something which is a lot
9 less subject to leaching because of the fact that it is
10 being fused.

11 Q. Can we turn to Exhibit 468 again on
12 page 72, and it is the large paragraph at the bottom.
13 I see it says:

14 Based on the bulk chemical analysis
15 Ontario Hydro flyashes are predominantly
16 composed of silicon, aluminum with
17 smaller amounts of calcium and magnesium,
18 sodium, potassium, and iron.

19 And then it goes on to list a number of trace elements,
20 and I can never remember what they stand for. I wonder
21 if you can help me with that?

22 DR. EFFER: A. They are arsenic,
23 selenium, chromium, vanadium and titanium.

24 Q. One thing that I don't see in that
25 list is radionuclides which are a characteristic of

1 flyashes, are they not?

2 A. That is correct.

3 Q. And you have said that flyash on your
4 testing meets the Regulation 309 leach tests as they
5 currently exist?

6 A. That has been discussed in previous
7 cross-examination, yes.

8 Q. Yes. But they don't meet the lake
9 fill guidelines, do they?

10 A. They do not.

11 Q. And they don't meet the water quality
12 guidelines, do they?

13 A. They don't meet the lake fill
14 guidelines because the bulk analysis does not conform
15 to a separate Ministry of Environment criterion, and in
16 that sense they fall short of being acceptable as a
17 lake fill material.

18 Q. Right.

19 A. In the Schedule 4 leaching tests most
20 of the ashes do meet the criterion for non-registrable
21 material.

22 Q. But those are different things,
23 aren't they.

24 We have said that they, on your testing,
25 meet the Regulation 309 testing. I am asking whether

1 or not -- and maybe you can turn to page 73. I just
2 wanted confirmation that the Ontario drinking water
3 quality objectives are not met either.

4 A. They don't meet the levels set down
5 in the table which we have in our previous evidence,
6 but the elements which are of concern to the Ministry
7 fall within the bracket of one to ten times those
8 levels, and in that sense they do -- they form a
9 non-registerable product.

10 Q. I am not quarreling with you at the
11 moment on whether or not it is a registerable product.
12 I am asking whether or not the information that you
13 have in this first large paragraph on page 73, I just
14 wanted confirmation of that information that says:

15 Comparison of ash pour water analysis
16 with the Ontario drinking water
17 objectives indicates that Ontario Hydro's
18 bituminous flyash pour waters exhibit
19 alkaline pHs, et cetera, and would
20 therefore be considered as potential
21 contaminants.

22 A. Some of the non-toxic components of
23 that do fall outside the standards, and therefore, that
24 is basis for them not being conforming.

25 Q. Thank you. I haven't seen any

1 reference in Exhibit 468 or any of the other exhibits
2 to the Ontario decommissioning guidelines, and I wonder
3 if you can help me on that.

4 Has Ontario Hydro done any testing to
5 determine whether flyash applied to land, for example,
6 would meet the decommissioning guidelines?

7 A. I am aware of the decommissioning
8 guidelines. I am not certain that we have done
9 specific testing to see if those guidelines can be met.

10 Q. And the decommissioning guidelines -
11 and you can correct me where I go wrong - those are
12 Ministry of the Environment guidelines which specify
13 soil quality for various purposes: industrial,
14 commercial, residential?

15 A. That's correct, yes.

16 Q. Now, I wonder if we can return to
17 Exhibit 494, and it will be page 42, and page 42
18 indicates an Interrogatory 8.42.13.

19 THE REGISTRAR: That will be .31.

20 ---EXHIBIT NO. 475.31: Interrogatory No. 8.42.13.

21 THE CHAIRMAN: Is it page 42, did you
22 say?

23 MS. FINDLAY: Page 42.

24 DR. EFFER: All right.

25 MS. FINDLAY: Q. AECL asked in the

1 interrogatory whether radiation is emitted from any of
2 Hydro's fossil fuel generating stations, and you would
3 agree with me that the answer received from Ontario
4 Hydro is that, yes, trace quantities of radioactive
5 materials are emitted from Hydro's fossil fuel
6 generating stations?

7 DR. EFFER: A. Yes, that answer is
8 correct.

9 Q. If you look down to table 1 a
10 calculation has been done in dosage, and I have now
11 learned that the little "u" indicates microsieverts.

12 A. Right.

13 Q. Ontario Hydro has set out the amounts
14 for energy sources, coal, oil, natural gas and uranium;
15 is that correct?

16 A. That is correct, yes.

17 Q. And the dosage indicated for all of
18 the fossil fuel sources taken together is 20.07. Are
19 my mathematics correct on that?

20 A. It is correct, yes.

21 Q. And uranium indicates a dosage of 120
22 microsieverts?

23 A. Yes.

24 Q. And the A to the minus 1 indicates
25 per year; is that correct?

1 A. Yes, that's right.

2 Q. If we look into the body of the
3 description of the interrogatory, the second last
4 sentence reads:

5 Radiation doses from fossil-fired and
6 nuclear generating stations are compared
7 in table 1 based on worst case
8 assumptions for all the energy source
9 conditions.

10 Is that correct?

11 A. That's correct.

12 Q. So this is a worst-case scenario?

13 A. Yes.

14 Q. And even at the worst-case scenario
15 both the fossil-fired stations and the nuclear stations
16 fall within the acceptable dosage limits; is that
17 correct?

18 A. I'm not sure what you mean by
19 "acceptable dosage limits".

20 Q. I understand there is a regulatory
21 standard for doses of radiation to the public?

22 A. Oh, the regulatory limits?

23 Q. Yes?

24 A. Yes. Yes.

25 Q. So if I could confirm then that both

1 the fossil stations and the nuclear stations fall
2 within the acceptable limits?

3 A. Yes, that is correct.

4 Q. I don't know if any of you might have
5 prepared this exhibit, but I wonder if you can estimate
6 what the more usual situation might be as far as
7 comparison between fossil stations and nuclear stations
8 as opposed to a worst-case scenario as is set out here?

9 A. I think the number of factors
10 introduced within each fossil option would be so
11 variable that it is fairly academic at short notice to
12 compare.

13 Q. All right. Do you know which
14 stations might have been compared in this
15 interrogatory?

16 A. I'm not sure. I do not know which
17 specific stations or even if specific stations were
18 used.

19 Q. Do you know if Ontario Hydro has done
20 any specific comparisons between fossil-fired stations
21 and nuclear stations of comparable size?

22 A. We have done analyses of coal and
23 emissions of radioactivity from coal, and of course
24 have comprehensive data from the nuclear stations.

25 [3:25 p.m.]

1 I'm not aware, I can be corrected on
2 this, but whether we have actually done a straight
3 comparison, or whatever the basis of comparison would
4 be, but the essential data is there.

5 Q. Would it be an onerous undertaking
6 for you to locate any studies that may have been done
7 comparing a particular nuclear station and a particular
8 fossil station of comparable size?

9 A. I am not sure how much work is
10 involved here. I think our attempt here was to get a
11 general comparison on making some very basic
12 assumptions. I'm not entirely convinced that much more
13 can be gained from adopting another set of more refined
14 assumptions.

15 Q. Would you agree with me then that
16 given that this is a worst case scenario, that the
17 comparison between a nuclear station and fossil station
18 as far as the dosage limits might be closer?

19 A. No.

20 Q. Okay.

21 MS. FINDLAY: Those are my questions.

22 Thank you.

23 THE CHAIRMAN: Does that complete the
24 examination then?

25 MR. HEINTZMAN: Yes.

1 DR. CONNELL: Just with respect to this
2 interrogatory, what is the unit MWE in the caption to
3 the table?

4 DR. EFFER: That is megawatts electrical;
5 in other words, equivalent electrical output.

6 MR. MEEHAN: That's generally what we
7 speak of when we speak of megawatts. But some parts of
8 our corporation would put a T there indicating
9 megawatts thermal, and in other parts we will put on E
10 indicating megawatts electrical.

11 DR. CONNELL: I can't understand why this
12 wouldn't be in an energy unit rather than a power unit.

13 MR. MEEHAN: The capacity factor is not
14 given there and I don't know why. Presumably an 80 per
15 cent capacity factor should have been assumed for all
16 of them. They would have had to have been, to put the
17 information on the same basis.

18 DR. CONNELL: Right. The question refers
19 to emissions, can I take it that this is the sum of air
20 and water emissions?

21 DR. EFFER: The answer to the
22 interrogatory doesn't make that terribly clear, Dr.
23 Connell. Certainly the great majority of the dose
24 would be received by the air, and I am not aware
25 whether that measurement of dose in the table does

1 include emissions to water.

2 DR. CONNELL: I would also be interested
3 in knowing whether this takes any account of solid
4 thermal wastes or used nuclear fuel, that's another
5 variable that seems not to be addressed. Could I leave
6 those matters with you as an undertaking?

7 DR. EFFER: In the second line we talk
8 about being emitted and that verb is usually confined
9 to air emissions, and I can only make the assumption at
10 this stage that we are dealing with doses associated
11 with air emissions, but we can find out.

12 DR. CONNELL: I will take that as your
13 evidence then unless I hear otherwise.

14 MR. HOWARD: Just so we don't lose it,
15 may I suggest it be given an undertaking.

16 THE CHAIRMAN: 478 number?

17 THE REGISTRAR: .24.

18 ---UNDERTAKING NO. 478.24: Ontario Hydro undertakes to
19 clarify table 1 on page 42 of Exhibit
20 494, concerning whether air and water
emissions are included and to add solid
waste.

21 THE CHAIRMAN: Do you have any further
22 questions, Ms. Findlay?

23 MS. FINDLAY: No, sir.

24 THE CHAIRMAN: Mr. Shepherd or Mr.
25 Mondrow, you are next, is that right?

1 MR. MONDROW: Yes. If we could have a
2 break, we will set up.

3 THE CHAIRMAN: Yes, we will take the
4 break now and start in 15 minutes.

5 THE REGISTRAR: Please come to order.
6 This hearing will take a 15-minute recess.

7 ---Recess at 3:30 p.m.

8 ---On commencing at 3:50 p.m.

9 THE REGISTRAR: Please come to order.
10 This hearing is again in session. Be seated, please.

11 THE CHAIRMAN: Mr. Shepherd?

12 MR. SHEPHERD: Good afternoon, Mr.
13 Chairman.

14 The emphasis of the Independent Power
15 Producers Society of Ontario in this cross-examination
16 is obviously on alternate energy technologies,
17 particularly their role in planning, although I will
18 obviously spend a little bit of time on fossil, I am
19 like to ignore it completely.

20 I would like to reintroduce you on the
21 record to Mr. Jeffrey Passmore who you know of course
22 as IPPSO's case manager. You may not know that he was
23 for sometime senior editor of Renewable Energy News, is
24 the former chair of the Conservation and Renewable
25 Energy Council of Canada, and the former president of

1 the Solar Energy Society of Canada. He will be giving
2 me his expert assistance in this cross-examination.

3 Before starting with the questions,
4 perhaps I could refer you to exhibits. The first one
5 which I would like to note on the report is this
6 weighty tome, which has been given the number Exhibit
7 493, and it is the California Energy Commission's
8 Technology Report, dated November 1991. Every two
9 years they do an update of the status of various energy
10 technologies, both on supply side and on demand side
11 and do this detailed analysis of what is there, how
12 much it costs and can they get it, sort of thing.

13 We will be referring to it in this
14 cross-examination and I anticipate a number of other
15 intervenors will be looking at it in later panels.

16 ---EXHIBIT NO. 493: California Energy Commission's
17 Technology Report, dated November, 1991.

18 MR. SHEPHERD: We have also asked that
19 you have available to you Exhibits 215, 116, 117 and
20 218. Those exhibits were filed in a package during
21 Panel 3.

22 THE CHAIRMAN: They are in a volume that
23 starts with 203; is that right?

24 MR. SHEPHERD: That is correct, Mr.
25 Chairman. And we will also be referring to some of the

1 exhibits that have already been referred to in this
2 panel.

3 Finally, we will be filing some further
4 exhibits on Monday but we just couldn't get them done
5 on time. For the second time in this our photocopier
6 broke.

7 We have a video tape which is being
8 edited currently and we will file that also on Monday.
9 I have been asked by the Board staff to raise one other
10 question. You will recall that there was a video shown
11 of Hydro commercials during Panel 3.

12 MR. HOWARD: Well, I was here for Panel
13 3, and I have had a lot of experiences but I don't
14 remember a video in Panel 3.

15 THE CHAIRMAN: There was a video shown in
16 some panel, I don't know which one it was.

17 MR. SHEPHERD: I'm sorry, it was Panel 2.
18 At that time it was intended to be filed as an exhibit,
19 of course, but it never got a number. So we have
20 spoken to Board staff and I am now asking that it be
21 given a number.

22 THE REGISTRAR: Next exhibit number, Mr.
23 Chairman, is 498.

24 THE CHAIRMAN: So that will be the video
25 that was shown on Panel 2.

1 ---EXHIBIT NO. 498: Video shown during Panel 2.

2 MR. SHEPHERD: Thank you, Mr. Chairman.

3 As usually preliminaries are almost as long as my
4 cross.

5 THE CHAIRMAN: Is that an undertaking?

6 [Laughter]

7 MR. HOWARD: Certainly best news today.

8 MR. SHEPHERD: I expect there are a
9 number of people in the room who wish it was.

10 CROSS-EXAMINATION BY MR. SHEPHERD:

11 Q. Let me start by clearing up a couple
12 of things. I guess the economics of fossil is Mr.
13 Meehan; is that right?

14 MR. MEEHAN: A. Yes.

15 Q. Could you please turn to Exhibit 217,
16 which was the one filed last summer. I don't know
17 whether you have had a chance to see this before, Mr.
18 Meehan, when it was referred to in Panel 3.

19 MR. HOWARD: 2.

20 MR. SHEPHERD: Wrong again, you're right.
21 Panel 2, I'm sorry, Mr. Howard.

22 Q. This is a calculation of the
23 monetized externalities costs of Ontario Hydro's coal
24 generation using the values that are mandated by the
25 Massachusetts Department of Public Utilities. You see,

1 for example, that under the Massachusetts values, which
2 are of course not in effect here, but under the
3 Massachusetts values there unscrubbed coal is a little
4 over 7 cents a kilowatthour, which is a little over 8
5 cents in today's terms, and your scrubbed coal is 3.72
6 cents, which if you put it in today's terms is a little
7 over 4 cents.

8 THE CHAIRMAN: Sorry, what does CPM stand
9 for?

10 MR. SHEPHERD: CPM.

11 MR. SHALABY: Combustion process
12 modification.

13 THE CHAIRMAN: What is that equivalent to
14 in our terminology, if anything?

15 MR. MEEHAN: We have been using that
16 terminology.

17 MR. DAWSON: It's a low NOx burner
18 basically.

19 THE CHAIRMAN: Low NOx burner.

20 MR. SHEPHERD: Q. Now, if the
21 Massachusetts values were in effect here, Mr. Meehan,
22 and just assume that for a moment, I am going to get
23 back to the question of why they aren't and shouldn't
24 be here, and you add to those values then your variable
25 OM&A and your fuel costs, isn't it correct that the

1 operating costs alone for your coal generation would be
2 in the range of 7 to 11 cents a kilowatthour in today's
3 dollars.

4 MR. MEEHAN: A. I am not sure what these
5 cents per kilowatthour are, whether they are a
6 levelized unit energy cost or whether they are the
7 costs that might apply to the year 1989. I'm not sure
8 whether they can be added or not.

9 Q. Fine. Under what circumstances could
10 they not be added then?

11 A. Well, I think you are wanting to add
12 them to the levelized unit energy costs.

13 Q. Yes.

14 A. In which case they would only apply
15 in the year 1989.

16 Q. Fine. And how would they not apply
17 or apply differently in 1992?

18 A. I am not sure what these costs would
19 be in 1992.

20 Q. Do you think that the cost of
21 unscrubbed coal, the environmental cost of unscrubbed
22 coal would be different in 1992 per kilowatthour than
23 in 1989? Is there something I don't know there?

24 A. No, but are you asking me to add
25 these to what -- it sounded like to me that you are

1 wanting me to add these to a levelized energy unit
2 cost.

3 Q. That's right.

4 A. Well, I am not sure that's
5 appropriate in any year really. The sum wouldn't
6 necessarily be appropriate in any year, because the
7 levelized unit energy cost is a representative of a
8 cost that would apply over a period of time.

9 Q. And this year, 1992, am I correct
10 that your variable OM&A and fuel costs per kilowatthour
11 are expected to be in the range of 2-1/2 to 3 cents; is
12 that correct?

13 A. For this year? Yes, in that order.

14 Q. And this year the emissions per
15 kilowatthour for scrubbed coal or unscrubbed coal, et
16 cetera, they haven't changed from 1989, have they, by
17 category?

18 A. Perhaps I didn't understand your
19 initial question. I don't think you were asking me to
20 add them to a levelized unit energy cost. I think
21 perhaps the question you asked me originally was to add
22 them to the OM&A and fueling cost.

23 Q. That's right.

24 A. If that's what you were asking me,
25 then yes, with adjustments for the several years

1 difference in timing then could you add these costs to
2 them if these were appropriate for Ontario.

3 Q. That, of course, doesn't include any
4 capital costs, right. We are just talking now about
5 the marginal cost of turning on a coal facility, the
6 kilowatthours?

7 A. Yes, I think so.

8 Q. Now, in any of your planning for
9 fossil generation, whether it's new facilities or
10 fossil life extension, do you in any way include this
11 sort of explicit recognition of environmental impacts?

12 A. Only in the way of judgment. We
13 don't include it explicitly, no.

14 Q. Now, again just accepting for a
15 moment the validity of the Massachusetts approach and I
16 am going to come to it. Would it be fair to say that
17 on the sort of numbers they use in Massachusetts, there
18 would be no place for coal generation in Hydro's
19 system, isn't that correct, because it wouldn't be
20 cost-effective?

21 A. No place for fossil generation?

22 Q. Coal generation.

23 A. I am not sure I could draw that
24 conclusion entirely. It would be not economic to some
25 other options we have.

1 Q. Fair enough.

2 THE CHAIRMAN: You have to use the same
3 kind of standards for the other options as well,
4 surely.

5 MR. SHEPHERD: Undoubtedly, Mr. Chairman.
6 Undoubtedly. It's only fair.

7 Q. In fact, if it were true that it were
8 8 or 9 cents, let's say, or even 7 cents a kilowatthour
9 to produce power from coal, if that were true, then
10 isn't it true that you should simply close your coal
11 stations right now because there are cheaper options
12 that you can get right now?

13 MR. MEEHAN: A. I am not sure there are
14 cheaper options that we could get right now.

15 Q. Than 7 or 8 or 9 cents?

16 A. What would they be?

17 We are including externalities in this
18 assessment. And I think, Mr. Shepherd, Panel 3
19 indicated to you how we included that in our analyses.

20 Q. Okay.

21 DR. CONNELL: May I discuss back you up
22 for a moment, Mr. Meehan. You said these were included
23 only in a judgmental way, my recollection is that FGD
24 is included in avoided cost where relevant.

25 MR. MEEHAN: Yes. I'm sorry, we do

1 include the costs of the control facilities, but these
2 are adding a value, as I understand it, the top box on
3 this page is a value that has been given in
4 Massachusetts, that if I understand this correctly,
5 it's not an additional cost but it's a value given to
6 somehow relate among facilities with and without
7 pollution control devices.

8 I don't know whether these are costs of
9 those facilities or whether they are something else
10 from looking at it.

11 DR. CONNELL: I presume that much of the
12 difference between the 7.02 and the 3.72 would in fact
13 be accounted for --

14 MR. MEEHAN: The costs of those
15 controls. I would think so but I really don't know.

16 THE CHAIRMAN: But surely we don't have
17 to revisit the issue that Hydro does not put monetary
18 values on externalities. Again, they may be wrong not
19 to do that but that's their position and it has been
20 their position throughout the panels. So I am not sure
21 where we are getting at by supposing that they do put
22 externalities on it because that of course would make
23 changes, obviously it would.

24 MR. SHEPHERD: That's fair, Mr. Chairman.
25 What I was really driving at was not externalities,

1 that merely a side issue and I recognize that.

2 THE CHAIRMAN: I'm sorry, I thought
3 that's what those figures were.

4 MR. SHEPHERD: They are but I am going
5 somewhere else with it than that. We have had that
6 debate already in Panel 3, I recognize that.

7 Q. Isn't it true, Mr. Meehan, as a
8 result of the, for example, air emissions from coal
9 that a number of places in the world have simply said,
10 no more coal generation, period, no life extensions, no
11 new plants, et cetera. California for example, just
12 simply mandated you can't do it anymore; isn't that
13 right?

14 MR. MEEHAN: A. I personally wasn't
15 aware of that, but that may very well be the case.

16 Q. Have you not looked at other
17 jurisdiction's clean air requirements in considering
18 your own policies?

19 A. I haven't personally.

20 Q. Who would have amongst this group?
21 No volunteers?

22 DR. EFFER: A. I believe that we look at
23 are our own clean air requirements and make a decision
24 as to whether there is -- probably the situations in
25 other areas are very different from the situation that

1 faces us and maybe that a conclusion is appropriate in
2 those jurisdictions.

3 Q. So, Dr. Effer, in looking at your own
4 emissions, internal emissions policies at Ontario
5 Hydro, you wouldn't look at what other jurisdictions
6 have done legislatively, or indeed utilities, in
7 controlling their own emissions and determining how bad
8 emissions are in the scheme of things?

9 A. We don't make a concerted effort to
10 review each utility's emissions, but we do,
11 incidentally, go to these utilities and find out how
12 they can help us solve our problems in terms of
13 equipment and methods.

14 Q. Okay. Mr. Meehan, although I have
15 just I don't want to go into externalities, I did
16 promise I would come back to why you feel the
17 Massachusetts values are not appropriate. Do you want
18 to deal with that or would you rather leave it?

19 MR. MEEHAN: A. Which values?

20 Q. The Massachusetts values.

21 A. I would prefer to leave it.

22 Q. Fair enough.

23 Let me skip around a bit because what I
24 am trying to do is clear up a couple of things at the
25 outset.

1 Could you turn to page 13 of Exhibit 452
2 please, Mr. Meehan. That's the DSP Update.

3 A. I have it.

4 [4:05 p.m.]

5 Q. I take it from what you are saying
6 there at the top under Fossil Units Life Extension, and
7 what you have said in your direct evidence that you
8 have now made a planning decision to extend the life of
9 certain fossil facilities; correct?

10 A. We made a decision to include life
11 extension in our plans, yes.

12 Q. Now, that is not the same as actually
13 deciding to do it. It is just planning to do it at
14 some time in the future; you don't have to commit yet?

15 A. That is correct, we don't have to
16 commit very much yet.

17 Q. As I understand it, there are three
18 costs associated with that. Correct me if I am wrong.
19 You have got extra capital costs, which are, as I
20 understand your evidence, \$9 million a year starting
21 now and then \$12 million during the extension period?
22 You have got a 7-1/2 per cent increase in the variable
23 OM&A, and you have \$3.6 billion of extra costs
24 associated with your environmental controls.

25 Is that right?

1 A. I am not sure you had the first part
2 of that right.

3 MR. BURPEE: A. I think you have
4 confused the \$9 million going to \$12 million was what
5 we quoted for Lambton, based on the reduced scoping
6 rehab. That is where the \$9 million came from. And
7 that is not just capital; that is capital and OM&A to
8 get to year 40, then the \$12 million in capital from
9 years 40 to 50.

10 Q. So at least the \$12 million a year is
11 right?

12 A. Correct.

13 Q. For life extension you have got --

14 A. \$3 million per unit.

15 Q. And that is starting in year 40?

16 A. Correct.

17 Q. But you will have some additional
18 capital costs between now and year 40 for any station
19 that you extend? Or is that wrong?

20 A. I'm not sure what you mean by
21 "additional capital". There will be a requirement for
22 capital in those years.

23 Q. Okay. And those capital costs are
24 more if you do extend than if you don't extend; is that
25 right?

1 A. Perhaps not in the next 10 years but
2 certainly in the last 10 years, yes.

3 Q. Fair enough. Now, if you total all
4 of those costs up, \$3.6 billion, 7-1/2 per cent, \$12
5 million a year, all that stuff, and you do whatever you
6 have to do with the numbers, your conclusion is that
7 those costs are less than the total cost of adding the
8 same amount of new capacity from another source for the
9 same time period; right?

10 MR. MEEHAN: A. Yes, that is basically
11 right.

12 Q. Now, your previous testimony the
13 other day suggests that you haven't yet determined how
14 long your life extensions will be; is that right?

15 A. That is true.

16 Q. I assume, though, that in order to
17 determine cost effectiveness you must have assumed some
18 sort of time?

19 A. Yes, you have to do that.

20 Q. What number of years did you assume?

21 A. We have looked at ten years and we
22 have looked at 30 years.

23 THE CHAIRMAN: I'm sorry, ten years'
24 extension and a 30-year extension?

25 MR. MEEHAN: Yes, but we have looked at

1 it merely to do what Mr. Shepherd is leading to, I
2 think, is to get a sense as to how economic life
3 extensions might be compared to new options.

4 MR. SHEPHERD: Q. And when you use ten
5 years and 30 years do I assume correctly that both ten
6 years' and 30 years' life extensions from economic?

7 MR. MEEHAN: A. Yes, the way it was
8 looked at. At ten years it was economic. I believe
9 Nanticoke was marginal at ten years.

10 Q. And, of course, why would it be less
11 economic at ten years than at 30 years?

12 A. Well, because you don't have the same
13 utilization to make use of the capital investment, on
14 the emission control facilities primarily.

15 Q. Is there a study or a detailed
16 analysis available that shows the calculations of those
17 economics?

18 A. In response to an interrogatory...
19 I'm not sure it has been sent out. It is in a package
20 to the MEA. There is a short assessment attached to
21 that interrogatory.

22 THE CHAIRMAN: Is that an interrogatory
23 or an undertaking; do you know?

24 MR. MEEHAN: No, it is an interrogatory
25 that we got very late, and I believe we are in the

1 process of -- today or Monday it will be sent out and
2 we could make that available.

3 MR. SHEPHERD: Q. Do you know the
4 interrogatory number off-hand?

5 MR. MEEHAN: A. There were a whole
6 number of them, and I don't know which one that one
7 would have been. I don't remember any of them, in
8 fact.

9 Q. I wonder if you could just find that
10 out and get it to us tomorrow perhaps. Could you do
11 that?

12 MR. HOWARD: We will find the number now
13 if we can before --

14 THE CHAIRMAN: Fine. That would be good.

15 MR. SHEPHERD: Fair enough.

16 Q. While Mr. Burpee is look for that,
17 Mr. Meehan, the analysis that you are talking about is
18 not the full cost/benefit analysis that you did, is it?

19 MR. MEEHAN: A. No, it is not. It is a
20 rather simplistic assessment that we thought would
21 serve the purpose. It is done using LUECs.

22 Q. And it doesn't show the background
23 calculations?

24 A. It gives you the information that
25 goes into the calculation, I think, in terms of what

1 the different control facilities cost and what the cost
2 for life extension is as in the Update DSP.

3 Q. Now, of course, in order to include
4 fossil life extension in the DSP Update you must have
5 done a more detailed study than simply a simplistic
6 analysis; correct?

7 A. No, we did not.

8 Q. That's it? 4,300 megawatts is sort
9 of a one-page calculation?

10 A. At this point in time that is what we
11 have, yes.

12 Q. Okay. So did you find the number?

13 THE CHAIRMAN: No, they will get for you
14 before the end of the day.

15 MR. SHEPHERD: Thanks a lot.

16 Q. I have a whole bunch of questions on
17 that but maybe I will just leave those until I see that
18 interrogatory. Let's not spin our wheels.

19 One interesting thing about this I guess
20 life extension, is the impact on intergenerational
21 equity, and maybe I can approach that by starting with
22 avoided cost and we can go from there.

23 For avoided cost purposes when you are
24 doing an analysis of a life extension you only include
25 the incremental costs of the life extension; correct?

1 MR. MEEHAN: A. That's correct.

2 Q. So you wouldn't include any of the
3 sunk capital costs, for example, or anything like that?
4 Those are all sunk, so they are not avoided?

5 A. That's correct.

6 Q. That is the calculation you would use
7 to determine whether it was cost-effective; correct?

8 A. As compared to a new option, that is
9 right. We would use the incremental costs of the new
10 option and compare them to the incremental costs of the
11 life extension.

12 Q. But in doing that -- by the way, do
13 you include the entire cost of scrubbers as being
14 incremental?

15 A. Yes, unless I am missing something in
16 the word "entire" cost of the scrubbers.

17 Q. Well, you wouldn't say, for example,
18 that you would have put some of the scrubbers in any
19 way so they are not incremental?

20 A. It depends on I guess the degree of
21 commitment and the point in time as to when you do
22 that.

23 For instance, the commitment has been
24 made on the first pair of scrubbers at Lambton, and
25 therefore, they would not be incremental in this

1 analysis.

2 Also in the analysis it is assumed that
3 we would proceed with a second pair of scrubbers at
4 Lambton and that we would also do the combustion
5 process modifications at Lambton.

6 So the analysis that is attached to this
7 interrogatory would in fact assume that those were sunk
8 costs.

9 THE CHAIRMAN: Even though they are not
10 yet committed?

11 MR. MEEHAN: Yes, that is the way this
12 work was done, Mr. Chairman.

13 In the case of Nanticoke all the
14 additional costs are assumed to be incremental, and
15 that is why I said in the case of Nanticoke the
16 economics are not as attractive as those at Lambton.

17 THE CHAIRMAN: There is an inconsistency
18 there; is that right?

19 MR. MEEHAN: I believe there is an
20 inconsistency, Mr. Chairman.

21 MR. HOWARD: Mr. Chairman, while we are
22 on the subject so we will be close by, the number will
23 be 8.9.119. I am told it is in the final process of
24 being settled. It was planned to be delivered Monday.
25 If we settle it before then we will give it to Mr.

1 Shepherd so he can look at it so he can have something
2 to read over the weekend.

3 THE CHAIRMAN: Can we give 8.9.119 a new
4 interrogatory number?

5 THE REGISTRAR: .32.

6 ---EXHIBIT NO. 475.32: Interrogatory No. 8.9.119.

7 MR. SHEPHERD: Q. Now, for rate
8 purposes, Mr. Meehan - and I know this isn't a hearing
9 about rates, but it is to a certain extent a hearing
10 about intergenerational equity - for rate purposes you
11 allocate annually all of the costs of a facility;
12 correct?

13 MR. MEEHAN: A. I believe we have to
14 collect the revenues to cover those costs, so we would
15 include all of our costs, yes.

16 Q. Now, you were asked the other day
17 what happens to your depreciation expense if you extend
18 the life of a facility. Have you found out the answer
19 to that yet?

20 A. I believe that was an undertaking. I
21 would have to say "no" to that question. Perhaps I
22 should know if we have undertaken to do that, but -- I
23 thought the only undertaking we had was with respect to
24 Dr. Connell's mothballing of Hearn.

25 Q. Well, I can ask you, is it true then

1 that if you extend the life of a fossil facility, or a
2 coal facility, let's say you have a 40-year life right
3 now, and you extend the life - I will take the middle
4 ground, 20 years, so it is now a 60 year facility - am
5 I not correct that then the depreciation should be over
6 60 years?

7 A. I am not sure whether it should be or
8 not. I think that a lot of utilities have a planning
9 life and a life that is used for depreciation.

10 Q. That would be investor-owned
11 utilities, right, in the United States?

12 A. May well be.

13 Q. Of course, the reason for that is
14 because they can recover more in the early years?

15 A. It could be. I think we have been
16 through a period, as I have testified before, where we
17 have had different planning lives than we have had
18 depreciation lives, and that may or may not prevail for
19 a while.

20 Q. But that period had nothing to do
21 with Hydro's internal decision to make that
22 distinction, did it? It had to do with the Ontario
23 Energy Board asking you to make the distinction for
24 separate reasons?

25 A. It originated that way, and Hydro

1 then, I believe, recommended to leave it the way it was
2 in subsequent reports. But the first submission, you
3 are correct.

4 Q. So the bottom line is you don't know
5 what the Depreciation Review Committee will do to your
6 life extensions, do you?

7 A. No, I understand that that is still
8 under consideration.

9 Q. Any extension of the depreciation of
10 a coal facility would increase the costs during the
11 extension period, wouldn't it, for rate purposes?

12 A. Would increase the cost?

13 Q. Yes. If you depreciate over 60 years
14 instead of 40 years, then in that last 20 years you
15 have in addition to the avoided cost which you have
16 talked about you have depreciation; right?

17 A. Yes, but you are dealing with that
18 over a longer period than you would otherwise deal with
19 it.

20 Q. That's right. What that would mean
21 is depreciation would be lower now, but it would be
22 included in those 20 years, right, at the end?

23 A. No, I am not following that.

24 Q. Well, if you are depreciating now so
25 that you will finish the entire cost in 2009--

1 A. Yes?

2 Q. --and now as a result of a decision
3 it is 2029 that you have to finish depreciating all of
4 the cost--

5 A. Yes?

6 Q. --isn't it true that your
7 depreciation goes down between now and 2009?

8 A. It would for that specific facility,
9 but in the scenarios you have described you would have
10 to replace the facility in one of those scenarios in
11 2009 and you would do that at no doubt a high capital
12 cost, and, therefore, you would have a very high
13 depreciation in that last -- a higher depreciation in
14 that last period.

15 Q. Well, you wouldn't do it at a high
16 capital cost if you were acquiring the power through
17 demand management or NUGs, would you? You would be
18 doing it at a zero capital cost; right?

19 A. That's possible.

20 Q. Okay. I will leave that.

21 MR. BURPEE: A. There is one other thing
22 in terms of depreciation. If you go from 40 to 60
23 years of plant life not all the components go from --
24 there are sub-accounts within the plant, and they have
25 different lives. So it is not as simple as saying

1 taking it 40 to 60.

2 Q. Well, it is true, isn't it, Mr.

3 Burpee, that if you went from 40 to 60 your current
4 rates, your rates today if you just went from 40 to 60
5 on all of your fossil facilities, your current rates
6 today would go down 3 per cent in real terms; isn't
7 that right?

8 A. I don't know what that number is.

9 There would be probably some reduction, but I wouldn't
10 say it is definitely 3 per cent.

11 Q. Could you undertake to find that out?

12 THE CHAIRMAN: That figure has just come
13 out of the air. Do you have some basis for that
14 figure?

15 MR. SHEPHERD: I have done the
16 calculations, but obviously what I say isn't evidence.
17 I would have assumed that it had been looked at by
18 Hydro.

19 MR. HOWARD: What the witness has
20 described is that it is not a simple calculation by
21 changing 40 to 60 and getting 3 per cent because there
22 are different rates and different elements, and it is
23 not a simple thing and in my submission is not relevant
24 to these proceedings.

25 MR. MEEHAN: I think that kind of

1 calculation is the sort of thing that would be done for
2 the Ontario Energy Board, and there are probably two
3 dozen people at Hydro today trying to do exactly that.
4 So if you have done it in the last week or so, then
5 perhaps we should get your methods. [Laughter]

6 DR. CONNELL: Can we just pause for a
7 moment on this question of the replacement facility?

8 Mr. Shepherd put to you the question
9 about demand management and NUGs. I assume he is
10 correct that there would not be a capital outlay by
11 Hydro - let's focus on the NUG facility - that I
12 presume over an extended period the total cost to Hydro
13 would be more or less exactly equivalent to the
14 replacement facility that you referred to, Mr. Meehan.
15 Is that...?

16 MR. MEEHAN: I believe it would, yes. It
17 would not appear in depreciation. It would appear in
18 an annual expenditure to pay for the NUG or demand
19 management.

20 DR. CONNELL: Right. And with respect to
21 demand management the question there would be, of
22 course, how close to the total customer cost the demand
23 management innovation comes.

24 MR. MEEHAN: I believe that is true as
25 well.

1 MR. SHALABY: I think Mr. Meehan was
2 following counsel advice in answering only the question
3 as asked. It doesn't appear in capital, but, as you
4 are elaborating, it does appear elsewhere.

5 MR. SHEPHERD: Q. Now, Mr. Shalaby, that
6 is interesting.

7 If the costs to ratepayers in the last 20
8 years are higher than avoided cost because they have
9 depreciation as well...which is correct, isn't it, in
10 the extended period?

11 MR. SHALABY: A. In the last 20 years?

12 Q. In the extension period, whatever it
13 is--

14 A. Yes.

15 Q. --the costs to ratepayers are higher
16 than avoided cost; correct?

17 A. I don't know that. The costs of what
18 are higher than what avoided cost? The cost of
19 extending the life of the fossil facilities?

20 Q. You calculate your cost/benefit
21 analysis on the basis of avoided cost, which is only
22 incremental cost; correct?

23 A. Right.

24 Q. Okay. Then, in addition, during the
25 extension period in addition to the avoided costs you

1 also have additional depreciation being charged to
2 those ratepayers; correct?

3 A. Ratepayers do not get charged avoided
4 cost.

5 Q. Well, avoided cost deals with all of
6 the incremental costs; right?

7 A. Yes, but it is not a ratemaking
8 concept. It is a concept used for comparing options.

9 Q. Mr. Shalaby, don't all those
10 incremental costs get charged to the ratepayers?

11 A. Yes, they do.

12 Q. And don't they total avoided cost?

13 A. Some of them are charged over
14 different schedules; some of them are charged for
15 different options.

16 Simplifying avoided costs or linking it
17 to the ratemaking process is not a straightforward
18 matter, unless you have figured that out, too. It is
19 not straightforward.

20 Q. Let's deal with the extension period.
21 NUGs would be paid avoided costs for that period;
22 right?

23 A. They would be paid purchase rates or
24 based on avoided costs, correct. Yes.

25 Q. Avoided cost is only incremental

1 costs; right?

2 A. Yes.

3 [4:25 p.m.]

4 Q. There is no capital component in
5 there? In the life extension there is no capital
6 component in there; is there?

7 A. I am trying to see whether -- you are
8 talking about avoided costs for the life extension or
9 avoided costs that are paid to the NUGs? Which one are
10 you...

11 Q. Presumably, the avoided costs paid to
12 the NUGs are at least in part a comparison of the price
13 paid to the NUGs with the costs of the life extension;
14 correct?

15 A. So far not. So far the avoided costs
16 are, as you are aware, based on comparable major supply
17 that Hydro would have put in place.

18 The avoided costs of life extension or
19 the costs of life extension is a fairly newcomer to the
20 package of options and I don't know to what extent
21 that's been incorporated in avoided costs.

22 Q. Well, it hasn't been incorporated in
23 any of the numbers we have to date; right?

24 A. Not to my knowledge, no.

25 Q. But if that's your plan then doesn't

1 your system require you to incorporate that into your
2 next set of numbers?

3 A. That's correct, yes.

4 Q. And take out the nuclear station, or
5 whatever it is that you had in there before?

6 A. I don't know what people are doing
7 back there in the shop, I am not sure, but take away
8 what was in the old plan and put what's in the new
9 plan.

10 Q. Exactly. So then NUGs are being
11 compared to life extensions at least indirectly; aren't
12 they?

13 A. Compared to a package of options some
14 of it is life extension.

15 Q. Okay. None of the capital costs that
16 are currently sunk costs for those facilities, the
17 extended facilities, are included in the avoided costs
18 you pay to NUGs, are they?

19 A. That is correct.

20 Q. All right. So then when we were
21 talking about --

22 A. But that was true before and after
23 life extension.

24 Q. Well no, it wasn't true before and
25 after life extension now, was it?

1 A. Any sunk cost is not included in
2 avoided cost before or --

3 Q. But when you have new facilities
4 being built in next decade, those capital costs were
5 being included in avoided costs; weren't they?

6 A. Yes.

7 Q. Now they are not.

8 MR. MEEHAN: A. No, it's still the case.
9 We are still including any capital costs that we are
10 incurring in the next decade.

11 MR. SHALABY: A. They are just reduced
12 amounts.

13 Q. They are just reduced amounts now;
14 right?

15 A. Or deferred dates or something. But
16 it's not difficult.

17 There are facilities planned for the year
18 2010, is it, 2011, and I presume the calculation
19 methods would see what the components of that will be.
20 But the timing of facilities would be later and the
21 amount and composition of those facilities will be
22 later.

23 MR. MEEHAN: A. The capital costs of the
24 emission control facilities is rather large as you
25 stated a minute ago, and whether or not they are

1 included in the avoided cost calculation or not, I
2 don't know. Again, I don't think that work has been
3 done. It's something that is in the mill.

4 Q. Let me turn to health effects. You
5 have talked about health effects in Exhibit 468, health
6 effects of fossil generation. I just have a couple of
7 things to ask about that.

8 The first one is on page 36. I think
9 they might all be on page 36. There is a chart in the
10 middle of that page that sets out the water uses by
11 fossil plants. And if I wanted to look at your current
12 conventional plants I would look at that CSC column;
13 wouldn't I?

14 DR. EFFER: A. That is correct.

15 Q. And I heard you the other day saying
16 that the total amount of cooling water used by Ontario
17 Hydro each year was - what was the phrase? - lakes and
18 lakes of it?

19 MR. BURPEE: A. Three lakes full.

20 MR. DAWSON: A. Actually, I have got to
21 admit to an arithmetic error in that number. It was
22 out by a factor of 1,000. It should have been times 10
23 to the 12th, not 10 to the 15th, while we are on the
24 topic.

25 Q. So it's not three lakes full anymore?

1 MR. BURPEE: A. It's 2-and-a-half.

2 MR. DAWSON: A. .3 lakes. Sorry, .03,
3 Dr. Effer just corrected me.

4 Q. Well, okay. I came at it another
5 way. Perhaps I shouldn't have given you a chance to
6 correct that. (Laughter)

7 I came at it another way. I just want
8 you to confirm to me that 130 litres of cooling water
9 per kilowatthour is -- that's 260 million litres an
10 hour for Lakeview running full out; right?

11 DR. EFFER: A. If your arithmetic is
12 correct, I will believe you.

13 Q. And just in terms of rough size, we
14 are talking about every six hours you would fill the
15 SkyDome, that sort of quantity. Isn't that what we are
16 talking about here? Or empty it.

17 A. My visual capacity is limited. I
18 will again go along with your vision.

19 Q. Well, I am not out by errors of
20 magnitude, am I?

21 A. I don't know.

22 Q. Well, let me put it another way then.
23 Your cooling water use each hour -- sorry, each six
24 hours at Lakeview you use about as much cooling water
25 as goes through your Mattagami hydroelectric

1 facilities; right? They are running about 500 CMS? .

2 A. Again, I will agree with you, if your
3 arithmetic is correct, yes.

4 Q. Can you agree with that subject to
5 check?

6 DR. CONNELL: I was just thinking, Mr.
7 Shepherd, they would have to give rainchecks.

8 [Laughter]

9 MR. MEEHAN: Acid raincheck.

10 MR. SHEPHERD: Let me just write that
11 down. [Laughter]

12 DR. EFFER: We are calculating out here
13 312 million litres an hour from Lakeview.

14 MR. SHEPHERD: Q. That's more than I
15 thought. I thought it was 260, but that's okay.

16 DR. EFFER: A. You're right. (laughter)

17 Q. I get that to be 260,000 cubic metres
18 an hour. If you just compare that to 500 CMS, it's 6
19 hours at Mattagami?

20 A. Yes, you're right.

21 Q. So it's a lot of water?

22 A. It's a lot of water.

23 Q. Then I looked at waste water
24 discharge and that's the dirty water you use to
25 transport ash and things like that; right?

1 A. It's from a multitude of sources that
2 were listed in my direct evidence, yes.

3 Q. And it's got all those toxic
4 chemicals in it that you referred to in your direct
5 evidence?

6 A. That is not correct. We do have many
7 processes that reduce some of those toxic elements.

8 Q. I will get to that in a second.

9 Now, a facility like Lakeview produces
10 enough waste water every hour to sort of fill this
11 hearing room, right, it's a lot? Am I in the right
12 range?

13 MR. DAWSON: A. To fill what, sorry?

14 Q. This hearing room?

15 A. This hearing room?

16 Q. This room, right here.

17 DR. EFFER: A. In what time?

18 Q. Every hour. 600 cubic metres?

19 A. 600 cubic metres. Yes, you're pretty
20 close.

21 Q. Okay. And a typical, let's say, 50
22 megawatt gas cogen facility has enough waste water
23 every hour to fill the area about under this desk;
24 right? Two cubic metres?

25 A. You are just prorating things down?

1 Q. That's right.

2 A. That's correct.

3 Q. Okay. So the waste water
4 implications of gas cogen as opposed to steam cycle
5 coal is a big difference; right?

6 A. Compared with the current water usage
7 of the coal burning station, yes.

8 Q. Now, can I ask you a question? You
9 talked about how you clean the waste water, and for the
10 most part how you do that is too technical for me, but
11 I understand that one of the main ways that you do that
12 is you simply dilute it; right?

13 A. No, that wasn't included in the
14 process.

15 Q. So you don't use dilution as any part
16 of your waste water handling?

17 A. The waste water goes into the
18 receiving body of water, but there is upstream of that,
19 there are processes that clean it up before it's
20 discharged.

21 Q. And those upstream cleaning
22 processes, do they include simply diluting it with
23 cleaner water?

24 A. No.

25 Q. I obviously got the wrong impression.

1 Because if you will take a look at page E7 of your
2 overheads. Now, E7 does not deal with waste water, of
3 course, it deals with once-through cooling. Do I
4 understand correctly that this line in this schematic
5 which is tempering, what you are doing there is you are
6 taking cold water and adding it to the warm water so
7 you get down to your discharge temperatures; right?

8 A. That is correct, yes.

9 Q. And that's a dilution, in effect,
10 that's what you are doing there. You are diluting.
11 Understand, I am still on cooling now.

12 A. Yes, it's a dilution.

13 Q. But you don't use this same technique
14 at all to reduce your parts per million of effluent
15 discharge for waste water?

16 A. Under the current guidelines we have
17 to conform to qualities before we discharge to a
18 receiving body of water.

19 Q. That wasn't my question.

20 This schematic shows that you have
21 tempering water for heat coming in before your
22 discharge; right?

23 A. Correct. And what I am asking is:
24 Do you use the same technique, tempering water in
25 effect, to dilute your effluent discharge so that it

1 will also get, at the time of discharge it will get
2 below the parts per million limits of the Ministry of
3 the Environment?

4 A. There are some parameters, I believe,
5 which are approached by a dilution and which are
6 acceptable by the Ministry.

7 MR. BURPEE: A. I might add, the waste
8 water streams are not treated by dilution.

9 All the streams that you are talking
10 about are dealt with usually by settling and filters
11 and then discharged and they met the criteria when they
12 enter the body of water.

13 The tempering stream that you mentioned
14 referred to in that overhead is strictly for
15 temperature impacts, and not all stations have that.

16 Q. I'm sorry, I just understood Dr.
17 Effer to say that for some of the aspects of the
18 effluents dilution is part of the process.

19 DR. EFFER: A. I was thinking of, for
20 example, pH where -- there is an agreement that that is
21 much better -- the pH range of the discharge is
22 accommodated preferably by dilution where it's very
23 poorly buffered rather than adding neutralizing acids
24 or neutralizing alkalis; in other words, adding more
25 solids to the discharge. It's an impact which is

1 extremely small and is best achieved to get within
2 guidelines by dilution. That was of the one that I was
3 thinking of when I was mentioning -- in fact, it's the
4 only one that I could think of.

5 Q. Okay.

6 MR. MEEHAN: A. Mr. Shepherd, before you
7 leave the comparison you were making on the waste water
8 discharge, I think you are going to leave the wrong
9 impression by comparing the size this room, if that's
10 what we were doing, to the combined-cycle option.

11 If you take your analogy and turn it
12 around the other way and assume that the volume of
13 water for the combined-cycle option would fit under
14 your table, then the conventional steam cycle option,
15 the volume of that water would fit under nine tables
16 and there are nine tables in this room. It doesn't
17 bear nearly the volume that I think you are -- if I am
18 making that comparison, unless you use some other
19 measure.

20 Q. And that's because of the difference
21 in megawatts; right? I was talking about a 50 megawatt
22 example as opposed to 2,000 megawatts example.

23 A. I didn't know you were talking about
24 a 50 megawatt example.

25 Q. That's what I said.

1 A. But to make the example you should
2 compare the same capacities.

3 Q. So we are talking about, let's say,
4 if we are talking 2,000 megawatts, we are talking about
5 combined cycle or cogen being -- down the panel. This
6 much, right? And coal being that much?

7 A. Ten per cent, yes.

8 Q. Thanks.

9 Let me go to page 27 of Exhibit 468.
10 That's a chart, figure 3.13 there is a chart of 1990
11 Ontario Hydro atmospheric emissions; correct?

12 DR. EFFER: A. Yes, I have it.

13 Q. Okay. Can I just ask you a question
14 about the first star at the bottom of that, which says
15 to convert to NO(2) multiply by 1.53; what does that
16 mean?

17 A. The measurement of emissions by
18 regulation is nitric oxide, NO, and when we are
19 measuring other factors we work out its conversion in
20 the atmospheric to the nitrogen dioxide, and that
21 factor is simply the multiplication factor to change
22 the molecular weight of nitric oxide to nitrogen
23 dioxide.

24 Q. It is the NO(2) which is the bad
25 thing; right?

1 A. It is the one to which the initially
2 nitric oxide is converted and it is the one that we
3 have described extensively in our direct evidence, yes.

4 MR. DAWSON: A. The reason we make the
5 conversion is that a lot of other jurisdictions measure
6 nitrogen emissions as nitrogen dioxide, so it just
7 makes them comparable.

8 Q. Fine. The other thing I note about
9 that is, I was pleasantly surprised at these carbon
10 dioxide numbers until I looked at the bottom, and those
11 numbers are all divided by 1,000; aren't they?

12 DR. EFFER: A. Yes, they are all
13 multiplied by 1,000, yes.

14 Q. So it's true, isn't it, that in 1990
15 Hydro emitted about 26 million metric tonnes of carbon
16 dioxide, correct?

17 A. You're adding?

18 Q. Just adding across.

19 A. Adding across, yes.

20 Q. That doesn't include the CO(2) from
21 any purchases from Michigan, from non-utility
22 generators, anybody else; right?

23 A. It doesn't include those, no.

24 Q. And that would be some additional
25 millions of metric tonnes; correct?

1 A. It depends on the purchases, how much
2 is purchased, yes.

3 Q. Well, 1990, we know you purchased a
4 fair bit of the coal-generated power from Michigan in
5 1990; didn't you.

6 MR. SHALABY: A. Yes, that was right.

7 Q. Mr. Shalaby, I am now turning to the
8 alternate energy review, Exhibit 433. You have said, I
9 think, that you were involved in the drafting and
10 editing of that review?

11 A. Not detailed drafting and editing,
12 no. But I was involved in reviewing it, but editing at
13 Hydro is a fairly excruciating activity and I didn't
14 get involved in that.

15 Q. Okay.

16 A. But I reviewed it.

17 My main role in Exhibit 344 is that I
18 commissioned that report. I asked the people who sat
19 together and put it together to -- I gave them the
20 terms of reference and asked them to produce the
21 report.

22 Q. Better yet.

23 A. Yes. Mr. Greenspoon was disappointed
24 that the people who produced it were not here, and
25 maybe I should have told him that I am the person that

1 created it.

2 Q. No, it's much better. That's much
3 better, at least for my questions anyway.

4 So tell us something about the genesis
5 of the report?

6 A. The purpose for it was in preparation
7 for this hearing, it was to make life easy, and I don't
8 know whether that will turn out to be true or not.

9 Q. No, it won't.

10 [4:45 p.m.]

11 A. To put together literally 50 or 60 or
12 70 documents that we had in Hydro on alternative energy
13 technologies that were not on a consistent basis, that
14 were not costing things on the same methodology, and
15 were not speaking necessarily on the potential and
16 costs in Ontario.

17 They had different purposes, and they had
18 a different focus, and the purpose was to put
19 everything together on a consistent basis and a
20 consolidated place. That is the genesis of that.

21 Q. So you set up some sort of study team
22 or report team that put it together?

23 A. That is right.

24 Q. And who ran that team?

25 A. There was a leader for the team.

1 Q. From Design and Construction?

2 A. Initially from Design and
3 Construction and then later on from Corporate
4 Relations.

5 Q. You changed leaders or they changed
6 departments?

7 A. No, they changed leaders. Well, the
8 leader went to Pickering for -- this frustrated him
9 probably, so...

10 Q. The leader went to work at Pickering
11 Nuclear Generating Station?

12 A. Yes.

13 Q. Maybe we can talk about the
14 technology parameters of that, but maybe first could
15 you just look at the transcript 109 - this is your
16 direct evidence, I think - page 19,101. Do you have
17 it, Mr. Shalaby?

18 A. I do.

19 Q. If you look at page 9 -- or, sorry,
20 line 9 you make the point there, you say -- sorry,
21 starting at line 7:

22 "We don't know what the impacts will
23 be and the costs will be if a very large
24 contribution takes place."

25 You are referring to renewables here.

1 "So we are looking at the next slice
2 of contribution and not half the
3 electricity or anything like that made up
4 of these options."

5 Now, this was a limitation on the scope
6 of this study; right?

7 A. It is more a limitation to our
8 knowledge and our experience, and yes, the scope -- the
9 scope of the study is limited to that.

10 And it is really a result of the study
11 and an impetus to the study. Our experience tells us
12 that we are unlikely to get thousands of megawatts all
13 of a sudden, and we don't know what the impact of that
14 will be.

15 Q. But you didn't in fact look at the
16 possibility of, say, 50 per cent of new generation
17 being from these technologies, did you?

18 A. No, we did not.

19 Q. Were you aware that in 1990 the U.S.
20 Department of Energy estimated that with nothing more
21 just leaving things as they are in terms of policy in
22 the next 40 years 25 per cent of all new energy would
23 be from renewables? Were you aware of that report?

24 THE CHAIRMAN: I'm sorry, would be what?

25 MR. SHEPHERD: 25 per cent of all new

1 energy would be from renewables.

2 THE CHAIRMAN: From renewables?

3 MR. SHEPHERD: Renewable energy.

4 THE CHAIRMAN: What does that mean - in
5 the opinion of the Department of Energy.

6 MR. SHEPHERD: That is solar, wind and --
7 I think it is solar, wind and hydro.

8 MR. SHALABY: In the United States that
9 was?

10 MR. SHEPHERD: Q. Yes.

11 MR. SHALABY: A. I wasn't familiar
12 exactly with that, but it wouldn't surprise me.

13 Q. Have you been following the U.S.
14 policy moves in the area of renewable energy?

15 A. Not in great detail, but here and
16 there, yes.

17 Q. Is there somebody at Hydro who does
18 that?

19 A. Well, the U.S. Department of Energy
20 has -- issues policy directives every now and then, and
21 different utilities and different utility
22 commissioners.

23 I think the scene in the United States is
24 different states have their own regulatory commissions,
25 and then they have the federal agencies as well.

1 Q. Okay.

2 A. So we follow more the jurisdictions
3 at the state level than at the federal level.

4 Q. Well, that's good. Okay. Well,
5 then, you would have been aware that the current
6 projections of the California Energy Commission are
7 that at the very minimum 50 per cent of new energy in
8 the next ten years -- sorry, new electricity supply in
9 the next ten years will be renewable energy; isn't that
10 correct?

11 A. My understanding is that they are
12 directing utilities to do that.

13 Q. Okay.

14 A. Yes.

15 Q. But your study then would not be
16 applicable to that sort of policy move, would it?

17 A. Well, if you include hydro --
18 hydraulic, if you include the Manitoba Purchase and the
19 hydraulic program we are proposing, in the next ten
20 years renewables are not a small fraction. The
21 inclusion of hydro changes the equation quite a bit.

22 Q. Well, of course, the California
23 Energy Commission's numbers don't include hydraulic, do
24 they?

25 A. I am not sure whether they do or not,

1 whether they include hydraulic from the Pacific
2 Northwest or not, I am not sure. But they may not. I
3 don't know.

4 Q. Okay. When the Alternate Energy
5 Review was being contemplated what were the factors
6 that went into the determination of what technologies
7 would be reviewed and how you would review them?

8 A. The primary factor is whether it will
9 be practical in Ontario in the next several years or
10 not.

11 Q. How would you know whether it was
12 practical until you did the study?

13 A. Well, we are not starting from
14 scratch, you know. We are basing that on ongoing work
15 and experience. This was not our very first look at
16 alternate technologies. This was, as I said,
17 consolidation and making things consistent. So we had
18 studies, we had opinions, we had information to make
19 that initial determination, and if we miss something we
20 will catch it next time.

21 Q. Did you make any attempts to identify
22 technologies that whether currently or on a predicted
23 basis although uneconomic have very significant
24 environmental benefits?

25 A. Can you give me examples just to

1 focus my mind on?

2 Q. I don't know. Solar technologies
3 other than PV, for example?

4 A. We looked at solar thermal in
5 addition to solar photovoltaic in our study.

6 Q. Can you show me where that is?

7 A. Yes. Chapter 1 is solar.

8 Q. Yes?

9 A. And just looking at the table of
10 contents, page 25 is entitled "Solar Thermal Electric
11 Technologies". It is -- open to page 25.

12 THE CHAIRMAN: It says 21 in my book.

13 MR. SHALABY: Is it 21? Yes, 21 in this
14 one as well.

15 MR. SHEPHERD: Q. But in your
16 analysis --

17 MR. SHALABY: A. And 25 as well there is
18 the experience. Technology description is on 21 and
19 the world experience is page 25, and then the potential
20 is on page 28. So solar thermal is looked at in here.

21 Q. But you didn't actually do any
22 analysis of it, did you? You just said, well, that
23 can't work in Ontario; now let's look at PV. Right?

24 A. That is -- the expert opinion is
25 that, yes. The diffuse nature of solar power in

1 Ontario in their view made that technology not suitable
2 for the Ontario climate.

3 That was not my judgment, you understand.
4 That was the judgment of the people who did this.

5 Q. In the parameters you established for
6 the people doing the study you didn't say, look at
7 these things and don't look at these things.

8 A. I said, look at solar. But I didn't
9 say, look at this part of solar and not that other part
10 of solar.

11 Q. Okay. Did the people who did the
12 study at any time do an analysis of all of the
13 technologies for the generation of electricity, the
14 full menu, if you like?

15 A. Not as comprehensively as the
16 selected six or seven that we have here.

17 Q. No, but did they do a list somewhere
18 that says, well, here is all the possible things we
19 could look at; now let's look at these ones?

20 A. I'm not aware of that, no. But
21 again, you know, what would you include on the lists
22 that you...

23 We mention in the beginning of the book
24 things like geothermal, ocean thermal, tides, waves,
25 other forms of alternate energy. We mention, for

1 example, in solar, satellite solar is a form of
2 alternate energy that is being discussed in the
3 literature, but we thought it is not practical in the
4 time horizon that we are looking at.

5 So there has been mention of other forms
6 and other conversion processes that we chose not to
7 dedicate any more paper to.

8 Q. You mentioned geothermal. Now, you
9 didn't actually look at geothermal; right?

10 A. We didn't have another look at
11 geothermal here. We looked at geothermal before, and
12 based on those conclusions and conclusions reached by
13 others for the Canadian situation we decided not to
14 spend any more time on it for this particular review.

15 Q. Are you familiar with a technology
16 called hot dry rocks?

17 A. Yes.

18 Q. Isn't it true that one of the best
19 locations for that technology in the world is the
20 Canadian Shield in Northern Ontario?

21 A. That I am not -- I can't confirm that
22 or disconfirm it. I don't know.

23 Q. You haven't studied that to see
24 whether that is the case?

25 A. We didn't study it, no.

1 Q. It is true, isn't it, that some tens
2 of billions of pounds are being spent on that in
3 Britain right now?

4 A. Tens of...?

5 Q. Of millions, sorry. Tens of millions
6 of pounds.

7 A. The billion English is 10 to the 12,
8 so -- but I don't know that for sure, but I would
9 suspect you may be right.

10 Is that right?

11 MR. DAWSON: A. I have no idea.

12 Q. Are you familiar with the concept of
13 a solar tower?

14 MR. SHALABY: A. Yes, I am.

15 Q. Can you tell us what it is?

16 A. I am trying to see whether we have a
17 picture of it here. A picture saves a thousand words.

18 Q. Maybe you do.

19 A. Yes, we do.

20 Q. Is there a picture in there?

21 A. Page 23.

22 Q. Oh, Barstow. Good.

23 A. It is a tower with a container of
24 fluid on top of it that is being heated by mirrors that
25 are focused on that container in the simplest

1 description of it.

2 So that field of mirrors around the tower
3 focuses the sunshine on the top of the tower where
4 there is a working fluid that is heated, and the heat
5 from that is extracted to a generator to make
6 electricity.

7 Q. This picture is of a project that
8 was, used to be called Solar 1; right?

9 A. That is right.

10 Q. And now it is called Solar 2?

11 A. They are tooling up to make Solar
12 out of this, yes.

13 Q. And isn't it correct that the several
14 utilities that are spending the money to develop this
15 in fact are planning on sizes in the order of 200
16 megawatts of fully dispatchable solar power?

17 A. Planning on for later stages, but
18 Solar 2 will not be that size.

19 Q. No, this is only 10 megawatts; right?

20 A. That's correct.

21 Q. Okay. Isn't it true that those
22 utilities expect it to be cost effective in a number of
23 areas of the United states?

24 A. I think that is the reason they want
25 to demonstrate the next phase, to find out whether in

1 fact it will be or not. But it has that promise in
2 that part of the world, yes.

3 Q. It does result in fully dispatchable
4 solar power if it works; right?

5 A. More dispatchable than Solar 1 was.
6 But fully dispatchable? I don't know.

7 Q. Well, doesn't it store the heat in
8 molten salt?

9 A. Yes, but whether it can store it 24
10 hours or six hours or what, I don't know. Depends on
11 the design and how it would work.

12 Q. If we go down to "Fuel Cells" the
13 only fuel you have looked at in the Alternate Energy
14 Review is natural gas; correct?

15 A. We mentioned others, but for costing
16 and environmental impacts we looked at natural gas,
17 yes.

18 Q. Environmentally, hydrogen and ethanol
19 are both better; right?

20 A. Depends how they are made, I presume.

21 Q. Okay. Hydrogen is certainly a lot
22 more efficient in a fuel cell, isn't it?

23 A. Yes.

24 Q. That is why you have to reform the
25 natural gas; right?

1 A. That is correct, yes.

2 Q. But you have excluded those fuels,
3 hydrogen and ethanol, solely on cost grounds; right?

4 A. Well, hydrogen, we view hydrogen as a
5 manufactured product. It is something you can get out
6 of natural gas, you can get out of electrolysis of
7 water.

8 We acknowledge that hydrogen is in fact
9 the ideal fuel or oxidant for a fuel cell, but we
10 didn't treat it as a fuel. There is -- it is not a
11 typical fuel like coal and oil, and so on.

12 It is not a natural resource. It is a
13 manufactured product.

14 MR. SHEPHERD: Mr. Chairman, I should
15 probably stop there given where I am in this, and I
16 should mention that we have agreed with Mr. Grenville-
17 Wood that on Monday morning the Solar Energy Society
18 will conduct their cross probably for two hours in the
19 middle of ours because that is the only time Mr.
20 Grenville is available.

21 If that is acceptable to the Board, it is
22 acceptable to us.

23 THE CHAIRMAN: Fine. It fits in rather
24 well with your cross-examination.

25 We will adjourn now until Monday morning

1 at 10:00.

2 THE REGISTRAR: This hearing will adjourn
3 until Monday morning at ten o'clock.

4 ---Whereupon the hearing was adjourned at 5:00 p.m.
5 to be reconvened at ten o'clock on Monday, March
6 2nd, 1992.
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